December 1942

THE FOUNDRY

FIFTY-FIRST YEAR

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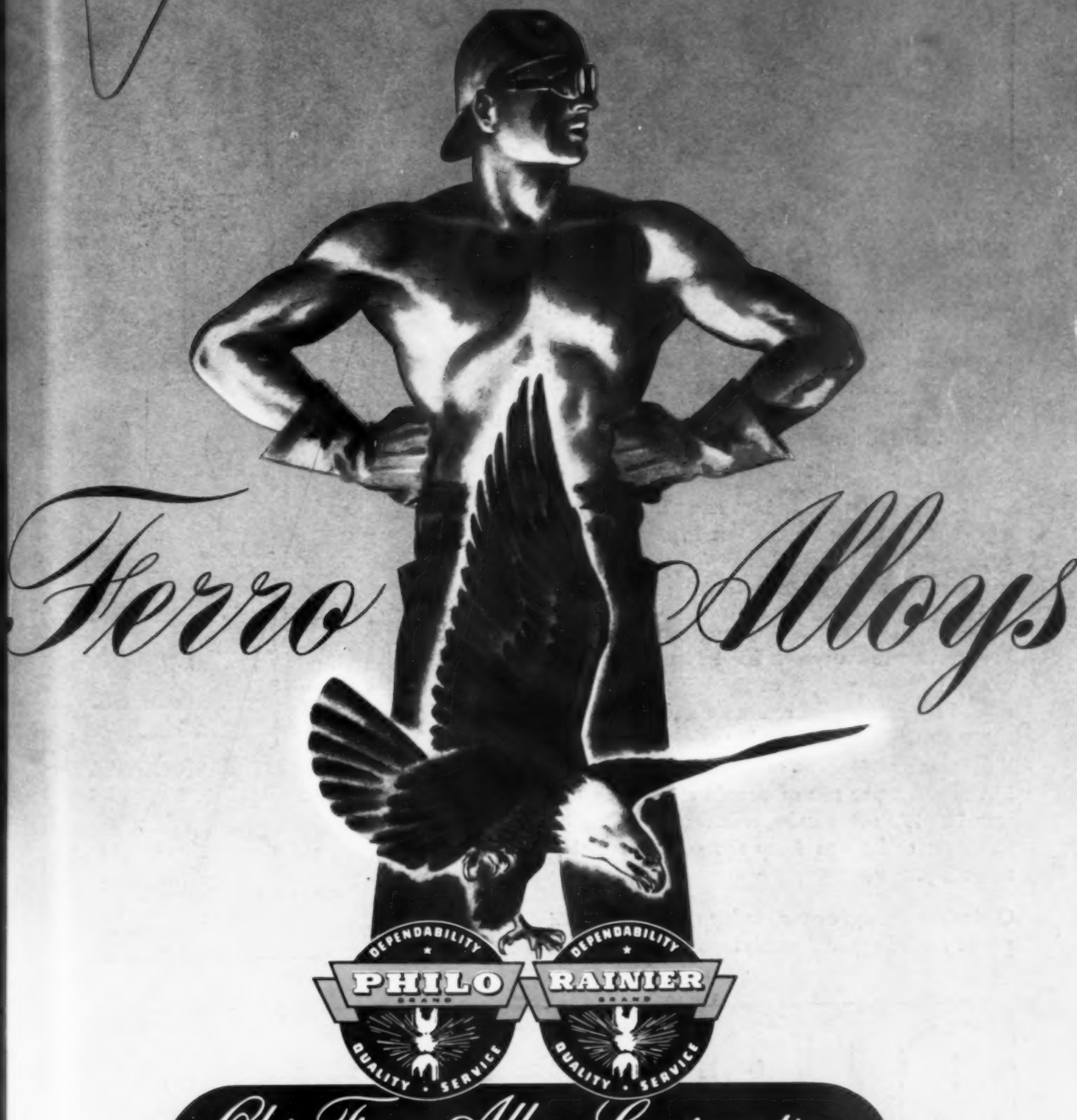


NOW...MORE THAN EVER YOU NEED Purite

To Give You Better, Stronger, Cleaner Castings!

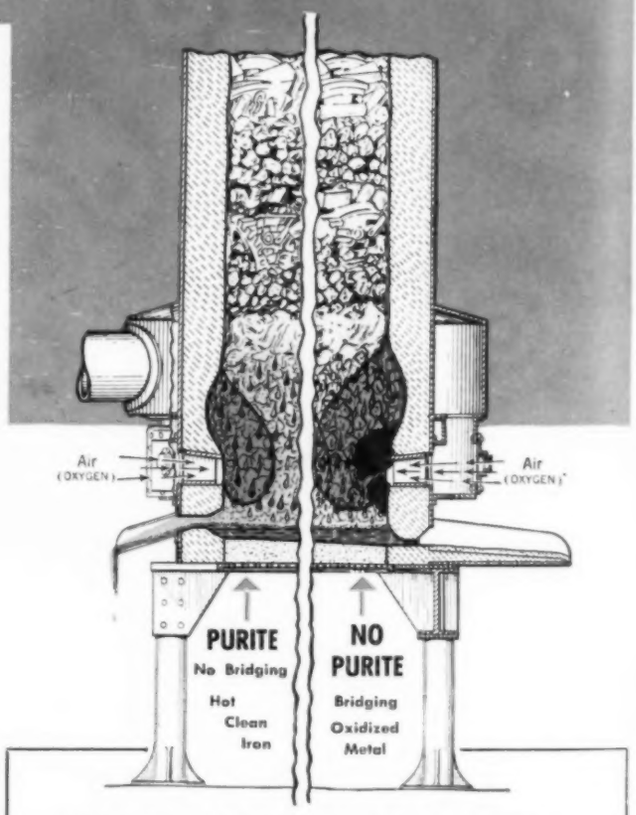
All over the country foundries large and small are stepping up their production to meet the increased demand for gray iron and semi-steel castings. This increased demand makes it vital that foundrymen turn out castings that are *sounder, better* machining. There can be no lag in production due to defective castings.

PURITE In The Cupola Makes *Cleaner* Castings!

PURITE increases the fluidity and activity of the cupola slag, acts as a catalyst in speeding up combustion. This results in higher melting temperatures, less oxidation, lower sulphur and hot *clean* iron.

Progressive foundrymen have found that they can reduce the weight of fluxing materials required for making an active fluid slag by using PURITE in the ratio of 1 lb. to each 10 lbs. of limestone or 2 to 4 lbs. of PURITE with 20 to 40 lbs. of stone per ton of cupola charge. In this way PURITE saves coke, reduces oxidation by the blast and helps keep the cupola running smoothly.

Order a trial bag, or ton, today and let PURITE prove itself in *your* foundry!



CROSS-SECTION OF CUPOLA SHOWING HOW PURITE WORKS

1. PURITE keeps the tuyers open and bright during long heats and prevents bridging—gives a clean drop at the finish.

2. PURITE restricts the uncombined oxygen in the blast or the combustion zone to a smaller, hotter area in front of the tuyers and prevents oxidation of the metal.

PURITE

THE SCIENTIFIC FLUX FOR BETTER MELTING AND CLEANER IRON

THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42ND STREET, NEW YORK, N. Y.
(Licensee of Metallurgical Development Company, Inc.)

The kid next door

We never noticed him much, one way or the other. He was just another kid with a crew haircut who was crazy about swing music and jitterbugging and who drove the family car much too fast. When the kid's father announced with pride that his son had soloed in one of those buzzing little yellow airplanes, we nodded politely and promptly forgot the whole thing. And after that, when we didn't see the kid around anymore, we forgot him too.

Last night we went to the movies. The newsreel was about half over when it happened. Suddenly there on the screen, crew haircut and all, was the kid.

He was standing on the deck of an aircraft carrier, fingering a flying helmet and obviously scared stiff. For a second we didn't get it. Somebody must have made a mistake.

And then the voice of an unseen interviewer said:

"Tell us how it felt when you started down through the Japanese anti-aircraft off Midway."

Up front somebody yelled excitedly: "Looky! It's Harry!" And then suddenly all over the theatre the people began to stamp and hoot and whistle. We never heard what the kid said. We couldn't have, in all that racket, and besides, we were too busy cursing ourselves for a sentimental fool because the screen had somehow gotten blurry and we realized that those hoarse noises that filled our ears were coming from our own throat.

Nobody needs to tell us anymore what Americans are fighting for, because we know. We're fighting for the kid next door, for swing music and idiotic dance steps, for corn flakes in the morning and Amos 'n' Andy at night, for Kansas wheatfields and Coney Island and Washington's monument—for the thousands of big important things and crazy little inconsequential things which, when you add them up, are America.

Bethlehem Steel Company and Bethlehem distributors have a vital role in this war, and are playing it with every bit of skill and energy they've got. The armed forces need steel for jeeps, peeps, tanks, planes, shells, bombs, motors, guns and ships on the battle front. Essential industries back home need steel for the multitude of behind-the-lines uses which keep the home front in fighting trim. Every day, every month we're striving to produce more steel, better steel, faster. The boys on the battlefields aren't just soldiers—they're neighbor Americans, they're *us*. And we don't propose to let them down.

BETHLEHEM STEEL

PORTRAIT

FOR ANY FOUNDRY'S HALL OF FAME

Federal Green Bond, product of the plant shown above, has earned its spurs as the "best of the bentonites" in hundreds of foundries. *Because* . . .

- **IT HAS *UNIFORMLY* HIGH GREEN STRENGTH.**
- **IT HAS *UNIFORMLY* HIGH DRY STRENGTH.**
- **IT IS *ALWAYS* SHIPPED PROMPTLY.**

The uniformity and strength of Green Bond are guaranteed by careful selection of deposits and constant laboratory control of every step in its preparation.

Prompt shipment is ensured by the huge capacity of our plant shown above.

For rebonding burnt sand or for making synthetic sands, don't say bentonite—say Green Bond.

You can't buy a better bentonite than Federal Green Bond!

THE FEDERAL FOUNDRY SUPPLY CO.

4600 East 71st Street • Cleveland, Ohio

CHICAGO CHATTANOOGA, TENN. DETROIT MILWAUKEE MINNEAPOLIS NEW YORK ST. LOUIS RICHMOND, VA. Mines UPTON, WYO.

THE FOUNDRY

Contents

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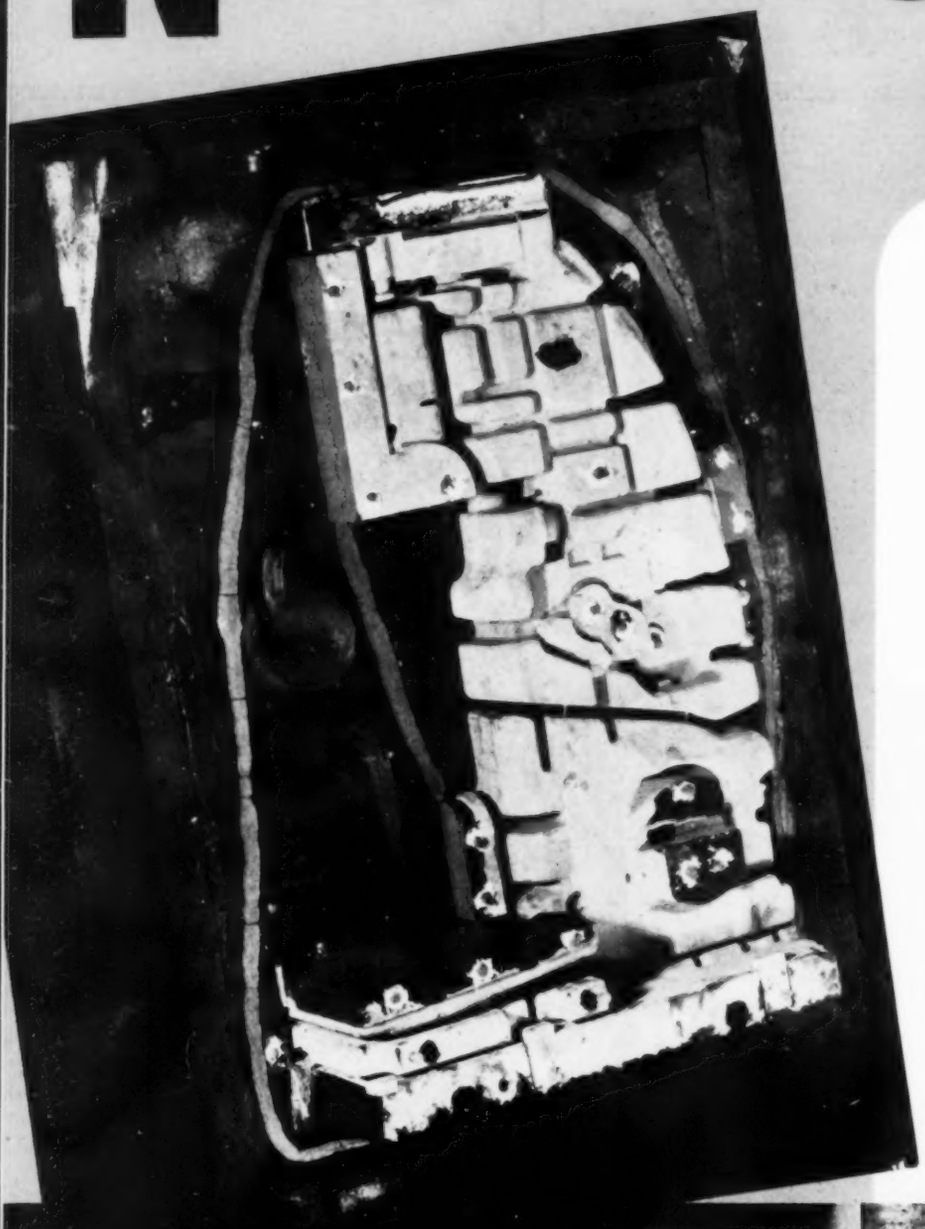
VOLUME 70
NUMBER 12

	PAGE
Editorial	65
Buick Speeds Production of Aluminum Alloy Cylinder Heads *By Arthur H. Allen*	66
Castings Featured at Metal Show	72
The College Graduate Looks at the Foundry Industry *By C. J. Freund*	74
Coal Stokers for Core Ovens *By Arthur Roberts Jr.*	75
Meets Exacting Requirements for Machine Tool Castings *By Pat Dwyer*	76
Foundry Equipment Manufacturers Consider War Production Problems	80
Theory of Shrinkage in Gray Cast Iron *By George A. Timmons*	82
Questions and Answers	84
Men of Industry	90
A.F.A. Will Hold Foundry War Production Congress in St. Louis	94
Among Detroit Foundries *By A. H. Allen*	96
The Adventures of Bill *By Pat Dwyer*	102
Foundry Developments at Short Range	108
Comment	110
Handles Foundry Material by New Method	113
Designs Molding Cabinet for School *By H. J. McCaslin*	114
New Foundry Equipment and Supplies	116
Activities of Foundry Groups	126
Obituary	138
Foundry Activities	139
Controlling Today's Gray Iron Problems *By Frederick G. Sefing*	141
Core Binders Fulfill Many Requirements *By Harry W. Dietert*	143
Make Patterns by Electrolytic Process *By A. K. Laukel*	146
Where-to-Buy Directory	171
Index to Advertisers	202

No winning a war



Zenith Foundry Company

MANUFACTURERS OF
QUALITY GREY IRON AND SEMI-STEEL CASTINGS
"ZENITE" DIE ALLOY
"ZENITE" CHILLED DIES
1501 So. 83rd Street Phone Greenfield 2680
WEST ALLIS, WISCONSIN

W. R. TANNER
PRESIDENT

Sept. 18, 1942.

Werner G. Smith Co.,
3003 W. Hopkins Street,
Milwaukee, Wisconsin.

Attention: Mr. Seward E. Shaver.

Gentlemen:

It is with a great deal of pleasure that we acknowledge 10 years of harmonious relationship with your Company.

Linoil has proven a stable product and one which we can safely rely upon as to uniformity in quality. Your service and co-operation in eliminating some of our core problems will always be very greatly appreciated.

Yours very truly,

ZENITH FOUNDRY COMPANY

GET:GS

Sec. & Treas.

LINOIL

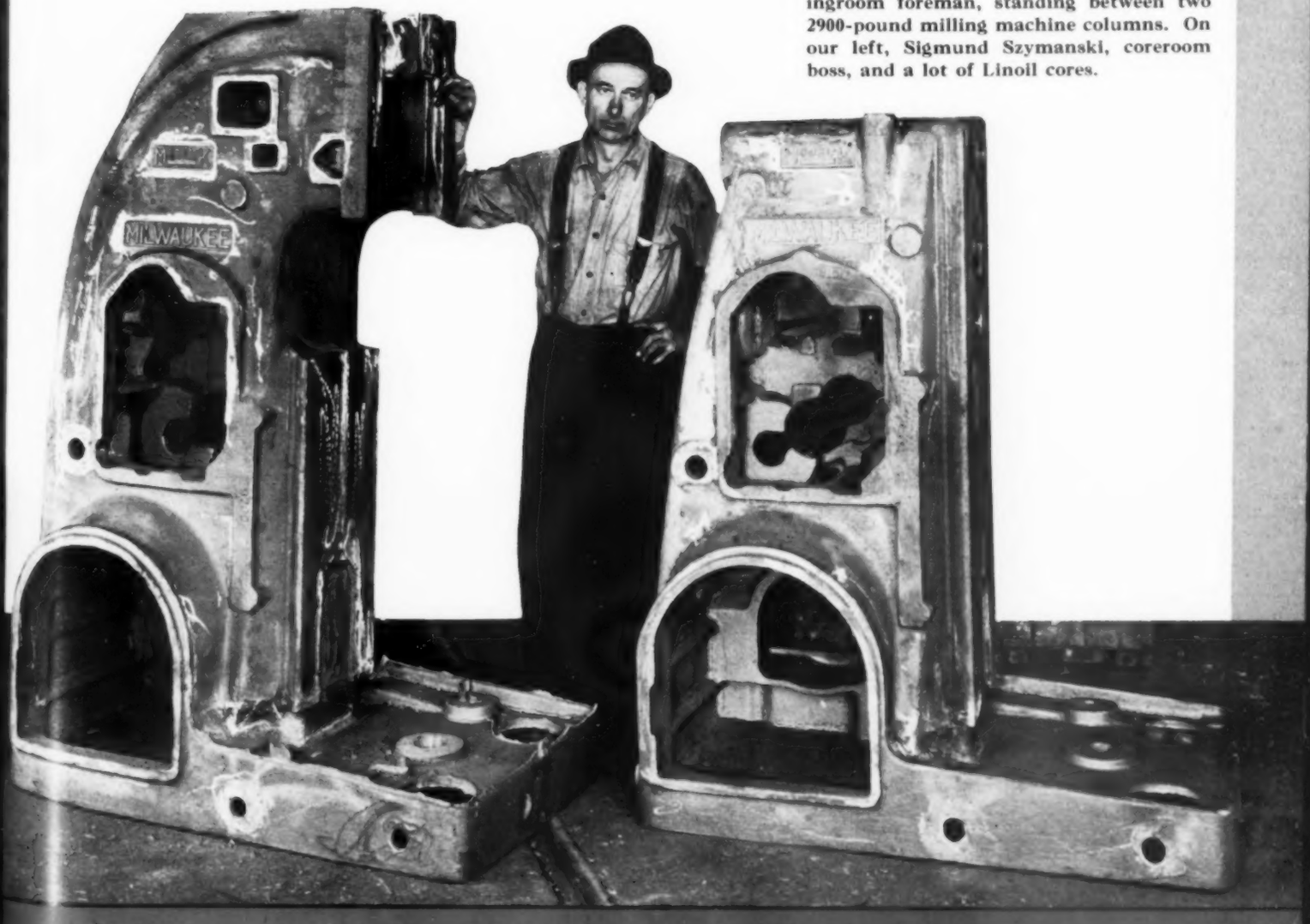
The surest way for you to know whether Linoil is as good for you as for the other fellow is to send for the Linoil man and have him demonstrate—or to order a trial drum and test it yourself. Warehouse stocks at 18 foundry centers besides Cleveland afford quick delivery wherever you are.

without sound cores

THE MAN in the street does not know what a sand core is, but the foundryman does. When a man is making precision castings for precision power tools, like Zenith Foundry Company, West Allis, Wis., is he knows right well the difference between passable cores and first class, sound, A-1 cores.

The vast tonnage of war castings all over the country made with Linoil cores carries a subtle suggestion to any foundryman not yet using Linoil to look into the matter and to see why Linoil is popular.

There is something about the way the cores knock out of the castings, something about the clean-looking castings and the scarcity of gasblown rejects, something about the drying and the bench work, and the ratio, and the economy, and the dependability, of Linoil cores that appeals to many foundrymen.



On our right we have Alfred Fisher, cleaningroom foreman, standing between two 2900-pound milling machine columns. On our left, Sigmund Szymanski, coreroom boss, and a lot of Linoil cores.

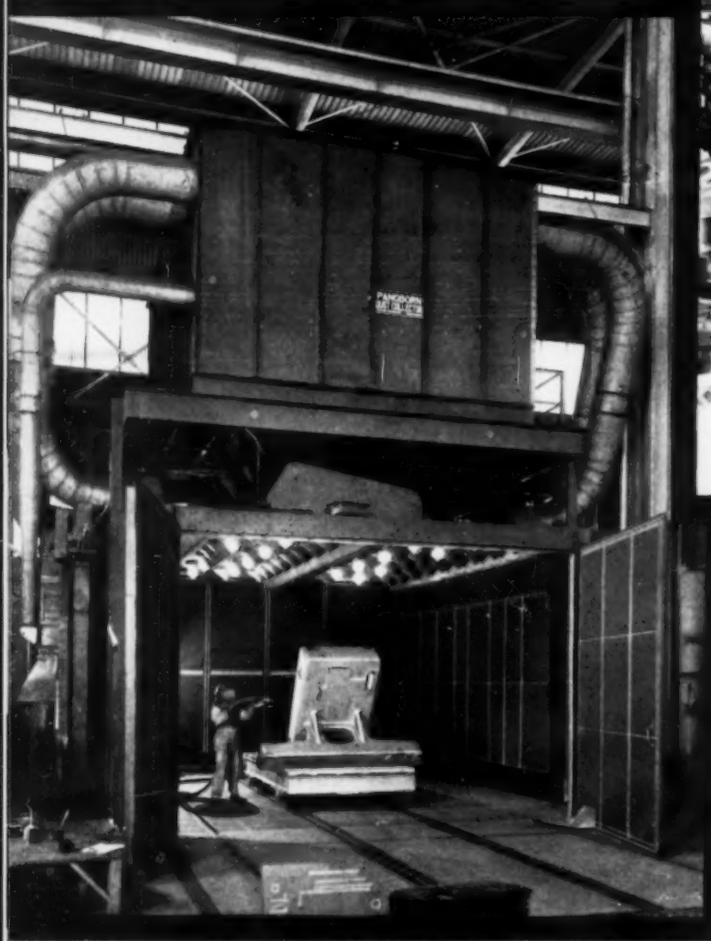
THE WERNER G. SMITH COMPANY

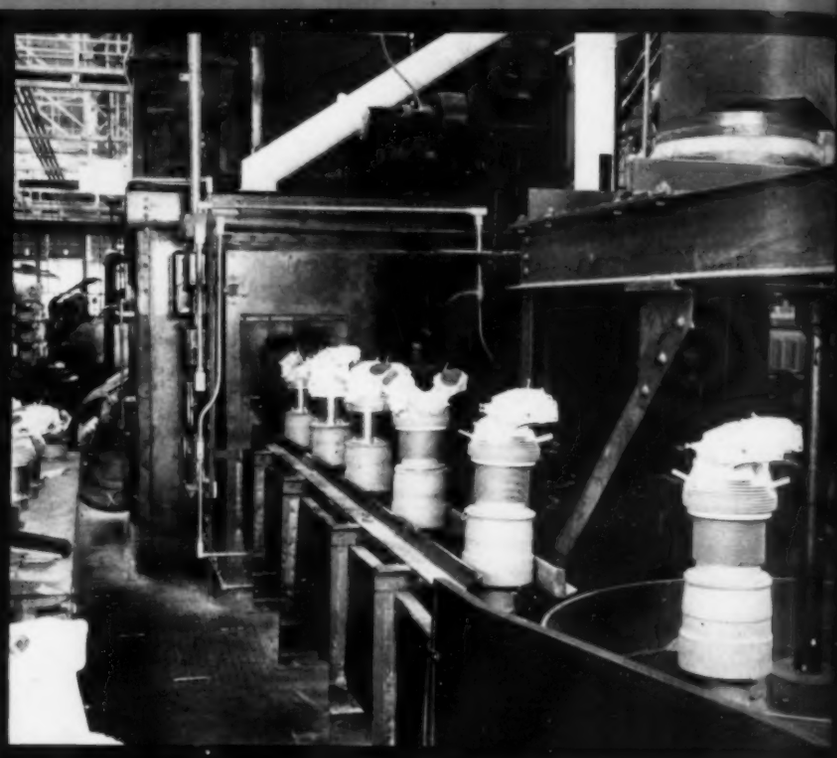
(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

2191 West 110th Street WOodbine 4690 Cleveland, Ohio

ROTOBLAST ENGINEERING PREPARE TREMENDOUS REQUIRED FOR THE 2ND

AIRPLANES →
TANK PARTS ↘





"BLAST CLEANING" IS QUICKEST

It took millions of pounds of castings, forgings, heat-treated parts, stampings, etc., to equip and transport a great U. S. Force like that which opened the second front in Africa.

Only the finest industrial teamwork in the world could have accomplished the task of getting ships and planes and tanks and guns and bombs and shells ready in the time that American industry did.

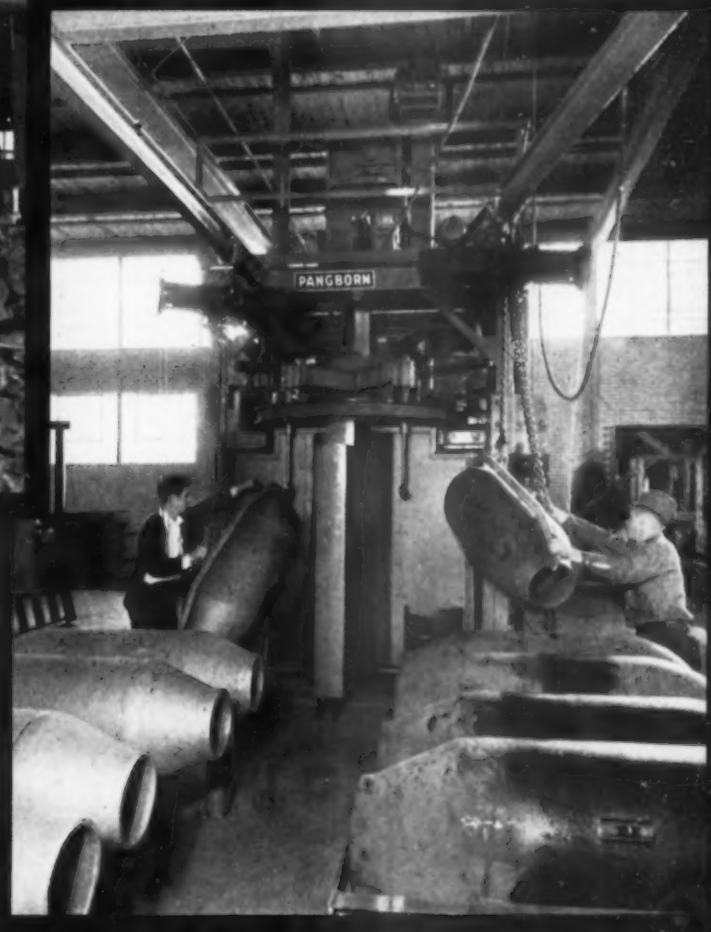
WORLD'S LARGEST MANUFACTURER OF BLAST

PANG

PANGBORN CORPORATION . . . . . .

AIDED U. S. INDUSTRY RESERVES OF WAR STOCKS FRONT OPENING IN AFRICA

← SHIP PARTS
↙ ORDNANCE



WAY TO "MORE OF EVERYTHING"!

At Pangborn we worked with every mind and muscle to make Alt and ROTOBLAST equipment available for EVERY WAR CLEANING NEED. Our aim—the BEST blast cleaning equipment ever built—shipped to production points as quickly as human resourcefulness allowed.

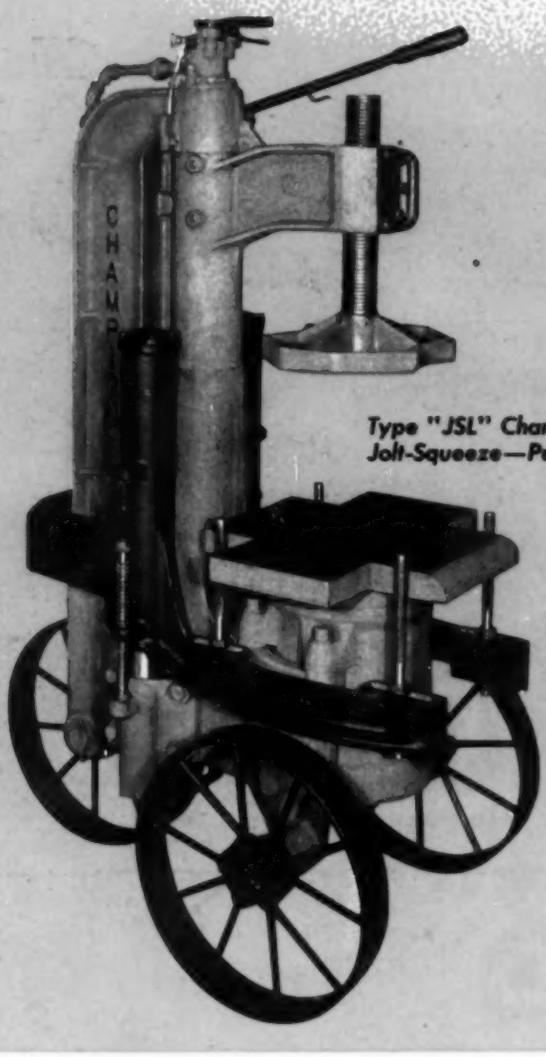
There is still much to be done. The war continues to hinge on foundry products. *For more production come to Pangborn.* We can and will help. Write or wire.

CLEANING AND DUST CONTROL EQUIPMENT

BORN

. . . . . HAGERSTOWN, MARYLAND

IT TAKES A WORLD OF EXPERIENCE 'O



Type "JSL" Champion Jolt-Squeeze—Push-Off

Type "JS" Portable Champion Jolt Squeezer

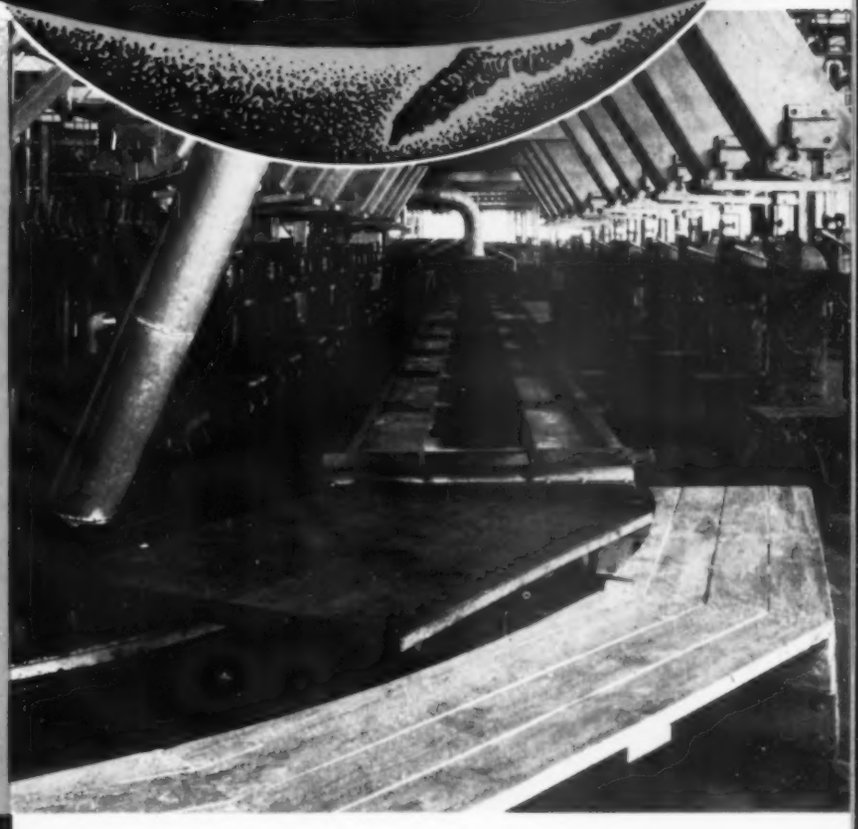
The Type "JSL" *Champion* Jolt-Squeeze—Push-Off and other *Champion* mechanisms are meeting the foundry's demand for equipment that may be quickly mastered by operators with little or no experience. Simplicity of design and efficiency of operation are the key to these Champions' outstanding records. They involve no cranks, bearings or gadgets. The lift frame is the only moving part of the pushoff unit—a direct lift balance frame with two extra long guides. Floor clearance is more than ample and there are no open guides where the sand may sift in. Adjustable lifting posts and automatically regulated lifting speed are other features.

The Type "JS" Portable Champion Jolt Squeezer is designed and built to machine tool accuracy for maximum service on the toughest kind of jobs. The one-piece cast steel column is more than ample support for the powerful squeeze unit. The 3″ diameter platen bearing is a hardened and ground shaft with hardened and ground bushings in the cast steel platen arm. The squeeze head is over designed for many extra years of toughest service. Extra long squeeze, jolt cylinders and accurately finished pistons. Rings in both pistons. Valveless type jolt unit with shut-off for variable load adjustment.

'O MAKE A

CHAMPION

Type "JS" Stationary Champion Jolt Squeezer



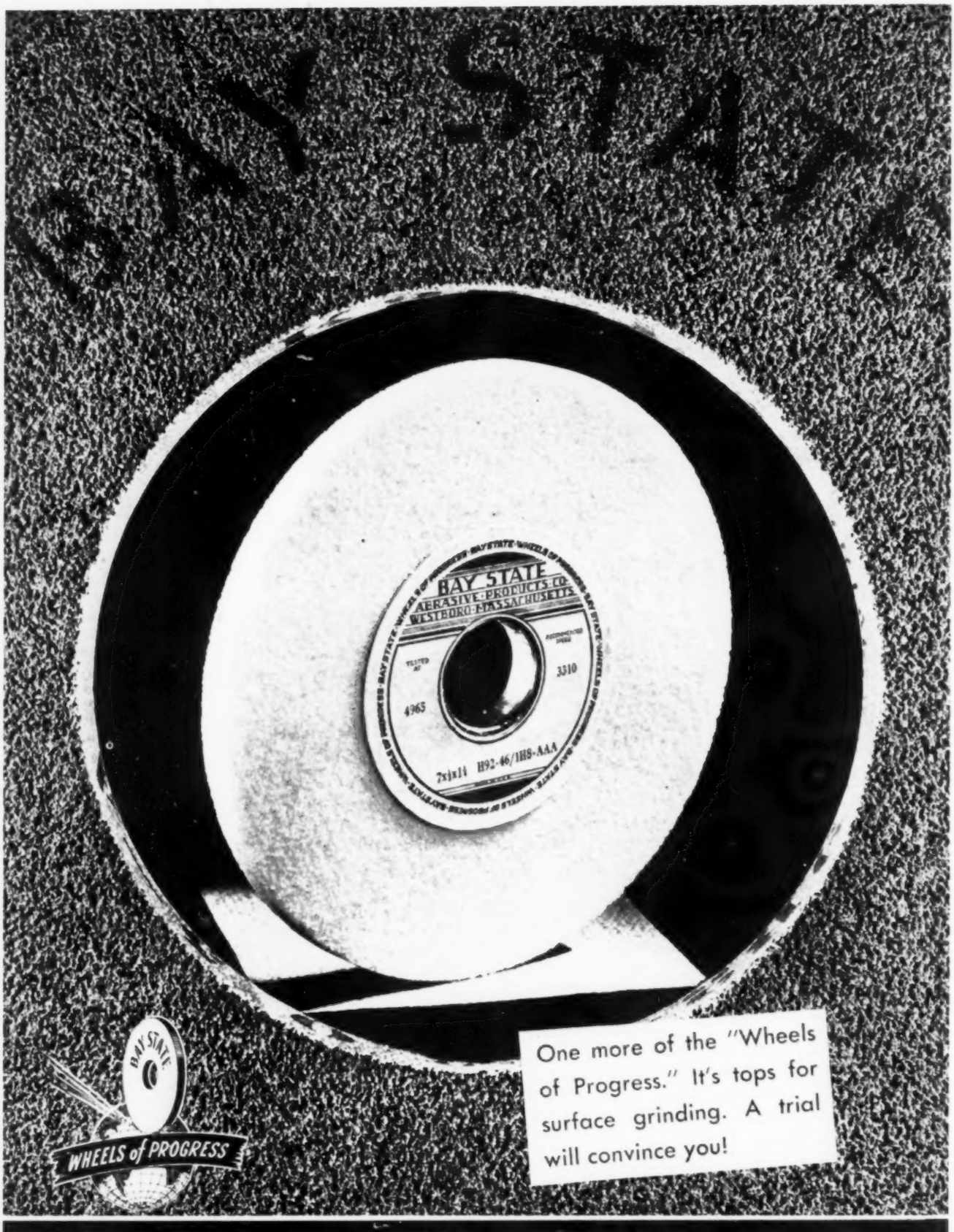
Battery of Champions in a modern production foundry

CHAMPION
Foundry & Machine Co.

1318 WEST 21ST STREET

CHICAGO, ILLINOIS

Inexperienced or careless molders are protected by a patented *Champion* feature which is available only on these modern units. The molder performs the squeeze operation by swinging the squeeze head into position with one hand and pulling the overhead squeeze valve lever with the other. The release of either or both hands automatically closes the air line to the squeeze cylinder. Both hands must be properly and safely occupied to complete the squeeze operation. *Champion's* new overhead squeeze valve arrangement forces the molder to stand in a natural upright position and keeps the valve free of sand at all times.


BAY STATE
ABRASIVE PRODUCTS CO.
WESTBORO, MASSACHUSETTS
4965
3310
7x1x1¼ H92-46/1H8-AAA
One more of the "Wheels of Progress." It's tops for surface grinding. A trial will convince you!
BAY STATE
WHEELS of PROGRESS
BAY STATE
ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.

3 Men + 8 Hours + a ROYER Combination = 2 Carloads of Conditioned Sand!

AMSCO

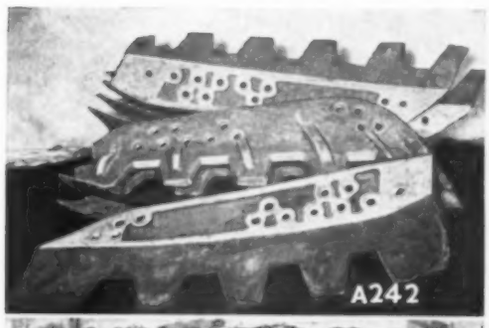
Typical manganese steel castings produced at Amsco's New Castle plant are shown below — dredge cutterhead blades, pig casting machine parts and ball mill liners.

SEVEN YEARS AGO the New Castle, Delaware plant of the American Manganese Steel Division of The American Brake Shoe & Foundry Company installed a Royer Combination Sand Conditioner and Scrap Remover. Since then, superintendents and sand crews have been enthusiastic about its performance.

TODAY four plants of the American Manganese Steel Division, familiarly known as "Amsco," use Royer Combinations. 13% manganese steel castings are not only highly resistant to shock stresses and abrasion, but cannot be machined by ordinary tooling methods—special equipment and a special grinding technique being required. Therefore, smooth castings, requiring a minimum of grinding, are important. Velvety, open sand that turns out smoother castings and is free of contamination is most essential and the Royer Combination provides it without "bottlenecking."

Royer Combinations are readily lifted about, from floor to floor, by crane or can be used as a central sand conditioning plant bringing the sand to the unit. Two models—"NDC" provides 20 to 25-tons per hour of "6-point" conditioned sand; "RC" provides 40 to 50-tons per hour. They're speeding war production in scores of medium and large iron and steel jobbing foundries.

Royer Foundry & Machine Co.
159 Pringle Street **Kingston, Pa.**



THE ROYER

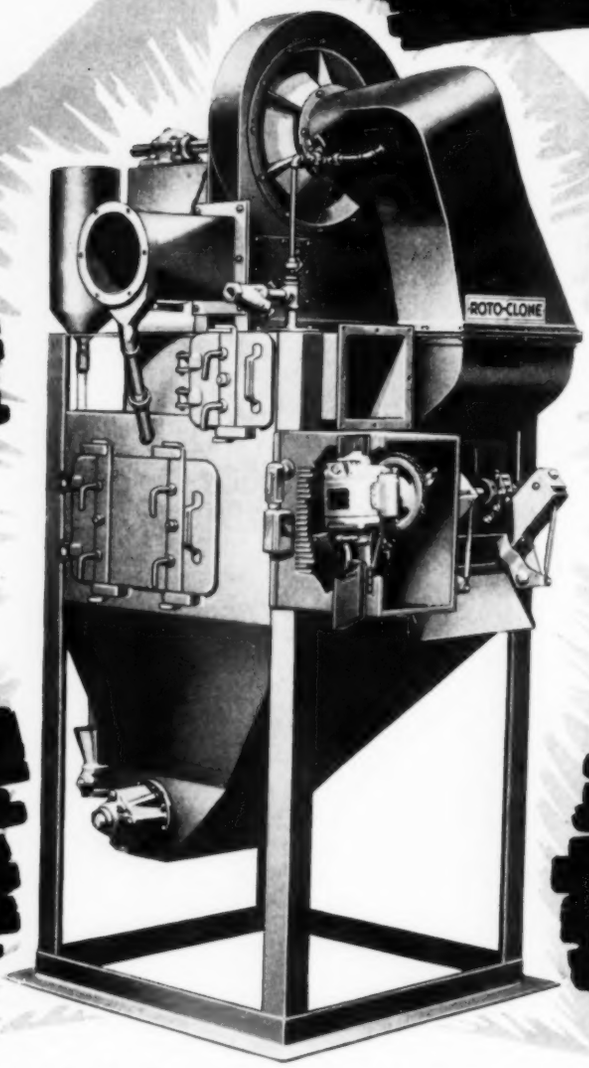
ROYER FOUNDRY & MACHINE CO. KINGSTON, PA.

Why ROTO-CLONE SPEEDS PRODUCTION SCHEDULES

Roto-Clone provides highest efficiency in dust removal over a wider range of particle sizes.

Roto-Clone requires a minimum of space — is a complete unit and requires no auxiliary equipment.

Roto-Clone delivers collected dust as sludge — eliminating secondary dust problems.



Roto-Clone guarantees constant performance at peak efficiency without interruptions for reconditioning or servicing.

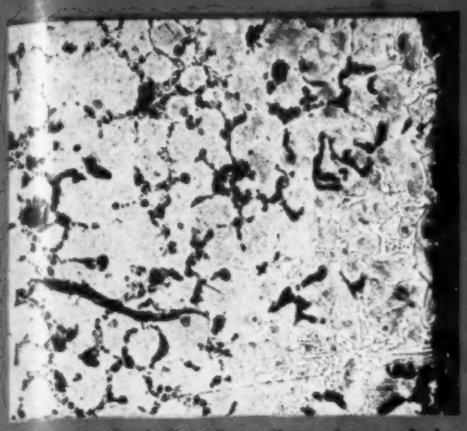
Roto-Clone exhausts constant air volumes regardless of dust concentration or presence of steam and fumes.

★ Vastly accelerated delivery schedules in all types of war industries have brought dust collection problems to the forefront in production planning. As a result, 3 times as many Roto-Clones were bought in 1941 as were sold in 1940, and the sales-curve goes still higher in 1942. Better than 95% of these have been installed in war production industries.
If you have a process dust problem write for Roto-Clone Bulletins which will be sent without obligation.

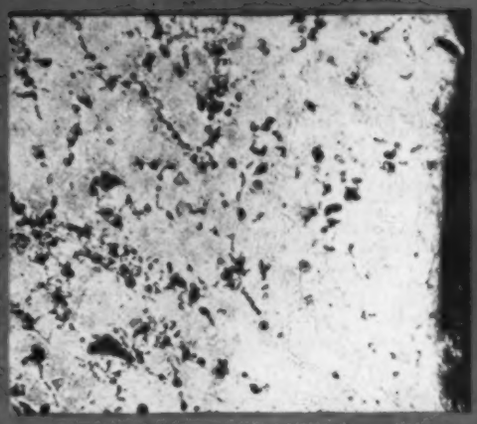
AMERICAN AIR FILTER CO., INC.
Incorporated
265 Central Ave., Louisville, Ky.
IN CANADA: DARLING BROS., LTD., MONTREAL, P. Q.

ROTO-CLONE
WATER SPRAY
DYNAMIC PRECIPITATOR

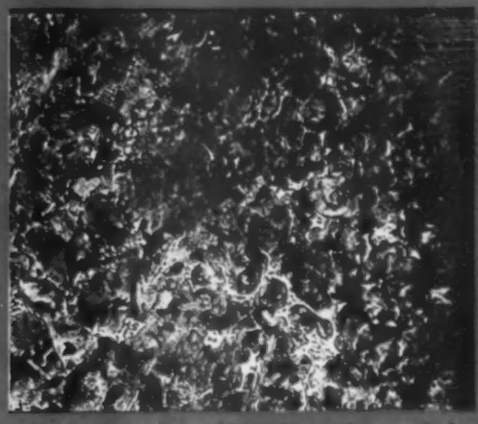
FOR FOUNDRY AAF DUST CONTROL



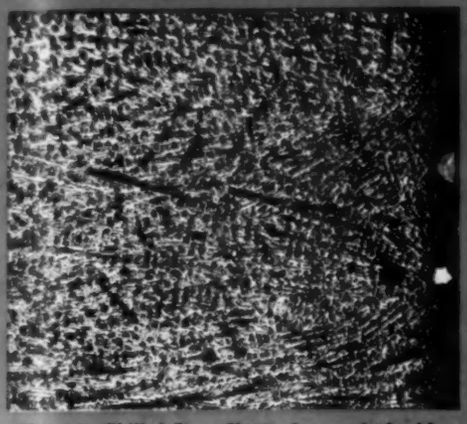
Heat 28—Sand Cast Face—X100—Iron melted with dry blast containing 1.5 grains moisture per cubic foot of air.



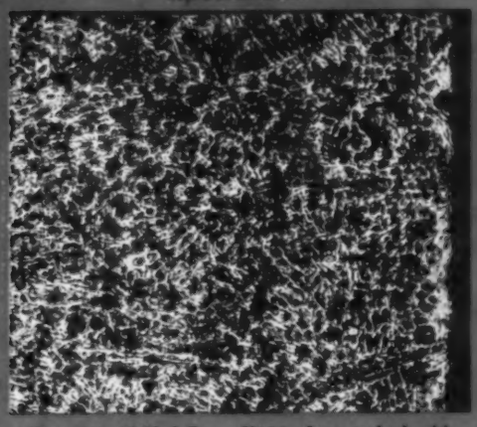
Heat 18—Sand Cast Face—X100—Iron melted with dry blast containing 10.4 grains moisture per cubic foot of air.



Heat 17—Sand Cast Face—X100—Iron melted with dry blast containing 21.2 grains moisture per cubic foot of air.



Heat 28—Chilled Face—X100—Iron melted with dry blast containing 1.5 grains moisture per cubic foot of air.



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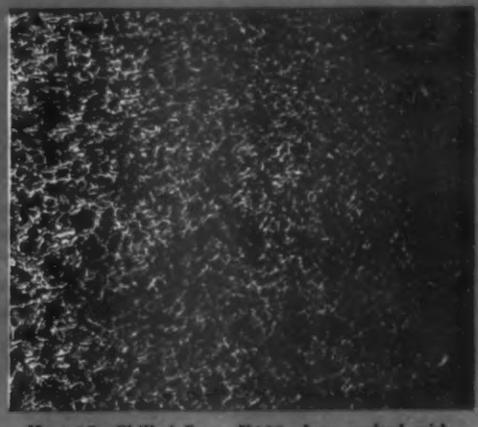


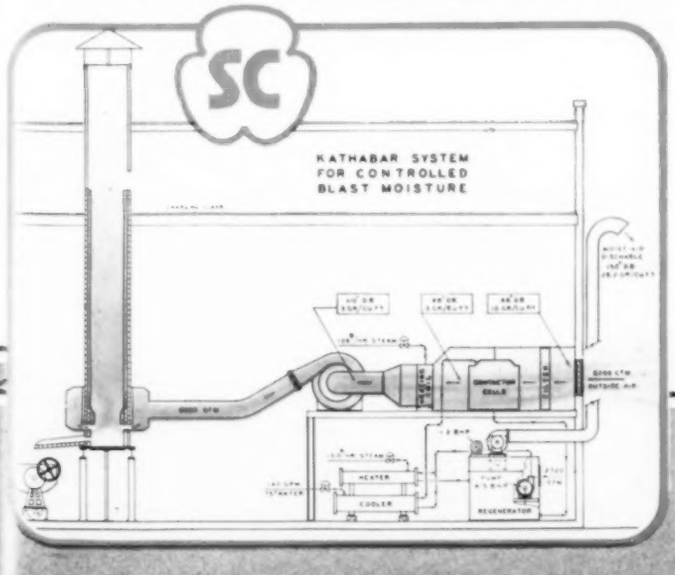
Heat 17—Chilled Face—X100—Iron melted with dry blast containing 21.2 grains moisture per cubic foot of air.

BLAST MOISTURE MADE THIS DIFFERENCE!

THESE microstructures are of gray iron, and show the effect of blast moisture on metal quality. A leading foundry prepared the sample specimens from a single cupola run. All conditions were constant except one. Blast moisture was varied: Heat 17 at 21.2 grains, Heat 18 at 10.4 grains and Heat 28 at 1.5 grains moisture per cubic foot of blast air.

Results showed a varying chill depth, by actual measurement from .75 in. to 1.5 in. as moisture increased, but the chemical analysis of the specimens differed widely, as these figures show:

Heat No.	Moisture grains per cu. ft.	Total Carbon	Combined Carbon	Mang.	Phos.	Sul.	Sil.
17	21.2	2.64	.95	.70	.136	.163	1.42
18	10.4	2.92	.82	.83	.144	.162	1.58
28	1.5	2.99	.71	.79	.122	.144	1.77



It is apparent that as blast moisture increased, total carbon content of the iron decreased, silicon content decreased and combined carbon increased. Hardness of the iron increased very considerably.

This brief resume has been taken from the 16-page, illustrated study, "The Effect of Moisture in the Manufacture of Metals". Therein are illustrated the many ways in which Kathabar Dry Blast pays dividends to the foundryman.

Better Quality . . . Uniform Quality . . . Constant Metal Temperature . . . Increased Production . . . Decreased Scrap Loss . . . Operating Savings . . . these are tangible factors where Kathabar Systems are in use. Furthermore, repeat orders for Kathabar units for cupolas indicate users' satisfaction.

Investigate Kathabar today. Write for a complimentary copy of the above mentioned study. Or, state the following conditions for prices and specific operating data: c.f.m. of blast required, maximum temperature of cooling water, steam pressure or other year around fuel available, and electrical power characteristics. There's no obligation.

SURFACE COMBUSTION · TOLEDO, OHIO

Also makers of Janitrol Furnaces and Unit Heaters, and SC Heat Treat and Heating Equipment.

Kathabar

MOISTURE CONTROL SYSTEMS

For Cupola, Blast Furnace, and Other Industrial Processing Operations

A SURFACE COMBUSTION PRODUCT

When PEACE Returns

SPEEDMULLOR

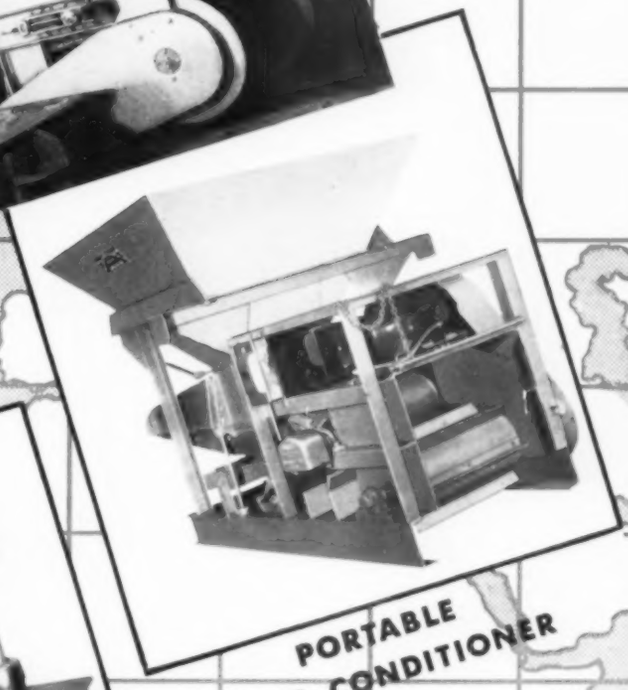
We'll Tell You Where and How

BEARDSLEY & PIPER

Equipment Produced Millions of Tons of Essential War Material

The story of B&P equipment and the part it is playing in the civilized nations' fight for the Four Freedoms is fraught with drama. Wherever foundries are producing castings for our all-out war effort, there you will find *Speedslingers*, *Speedmullors* and other B&P products. As previously undreamed of casting tonnage comes from America's foundries, more and more *Speedslingers* and *Speedmullors* are demanded. As our production of guns, tanks, turrets, rudders, keels, jeeps and trucks gains ever-increasing momentum, the Beardsley and Piper organization is meeting the need with Better Methods for the foundry.

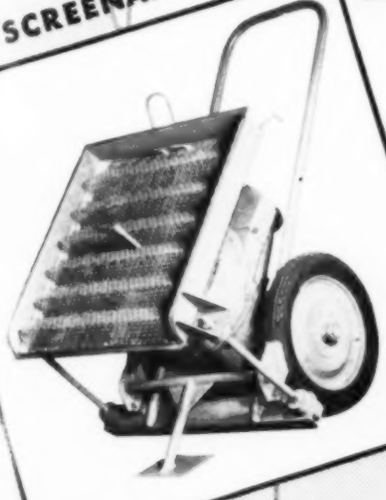
SPEEDSLINGER



PORTABLE
SAND CONDITIONER

GYRATORY SCREEN

SCREENARATOR

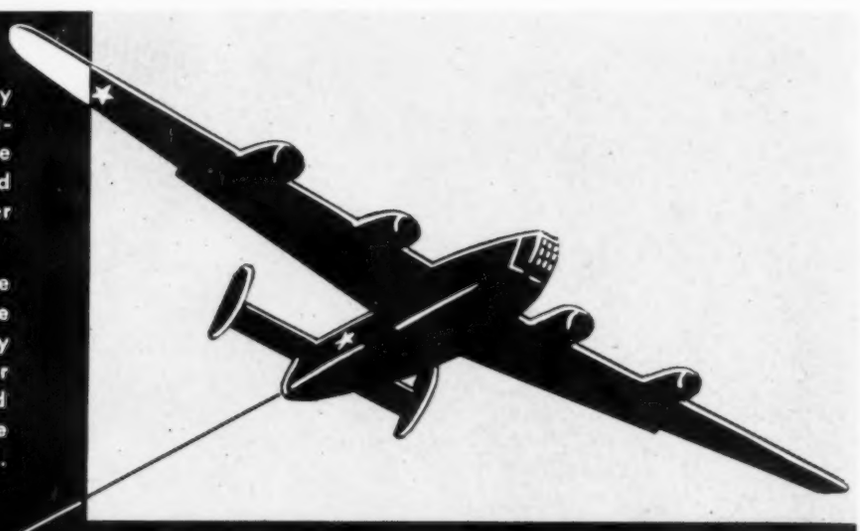


The Beardsley & Piper Co.

2541 NORTH KEELER AVENUE • CHICAGO

DELTA Products for the Foundry do two specific jobs . . . consistently, efficiently and more economically . . . (1) Help Speed Production and (2) Produce Finer Finished Castings.

Leading foundries all over the Nation use Delta Products for the Foundry. They know that every Delta product is produced under strict laboratory supervision and is guaranteed to do, better, the job for which it is recommended.



DELTA FOUNDRY PRODUCTS PLAY A VITAL PART IN SPEEDING-UP WAR PRODUCTION

DELTA
CORE & MOLD WASHES

Produce finer finished steel castings of all types . . . Armor Plate, Steel Cast Shells, Gun Mounts, etc.

DELTA
GRAKOAT . . . . . .

For grey iron, malleable iron and heavy non-ferrous castings. Improves the finish and materially reduces cleaning room costs.

DELTA
NON-FERRUSKOAT . .

For Aluminum, Magnesium and other non-ferrous castings. Produces unusually fine finished surfaces.

DELTA
PARTEX (Nut Shell Parting)

The Parting which produces results equal to Lycopodium at only a fraction of the cost.

DELTA
SPRAY BINDERS . . . .

Produce a torch, or oven dried, finish on green sand molds.

DELTA
NO-VEIN COMPOUND

Produces proper hot strength and eliminates veins and fins on castings.

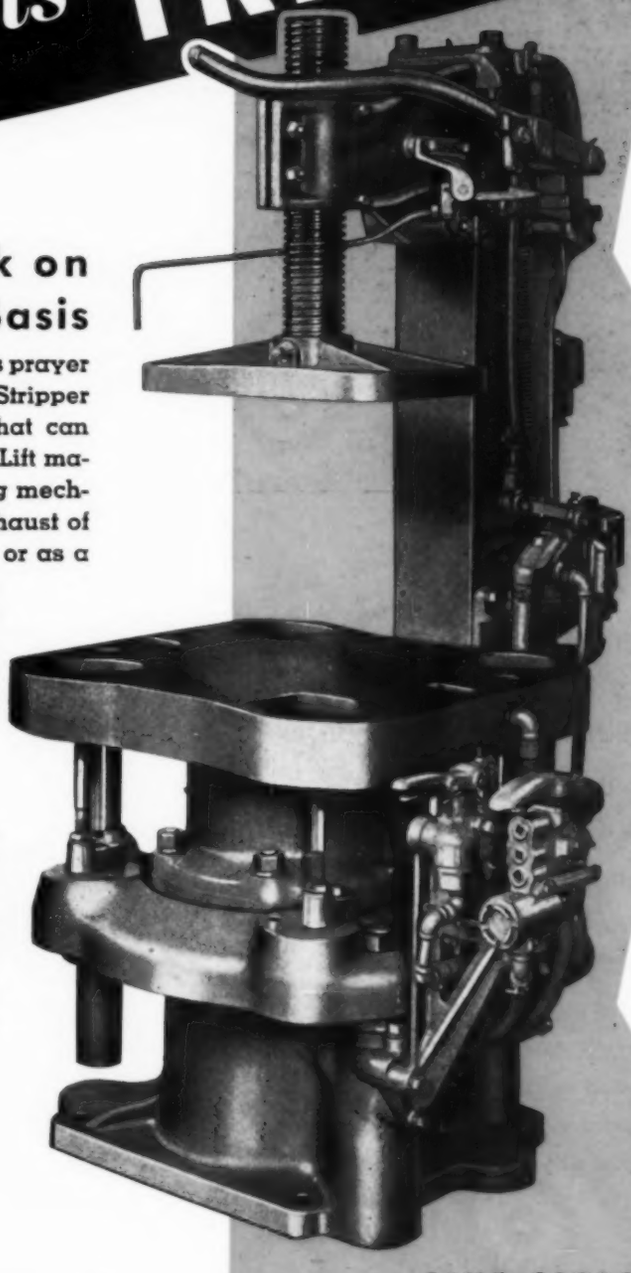
DELTA OIL PRODUCTS CO.

MANUFACTURERS OF INDUSTRIAL AND AUTOMOTIVE OILS, GREASES AND COMPOUNDS

MILWAUKEE **WISCONSIN**

MILWAUKEE JOLT SQUEEZE PIN STRIPPER

. . . This ONE Machine Performs TRIPLE DUTY!



Puts Jobbing Work on a Fast, Production Basis

Here's the answer to a foundryman's prayer — the Milwaukee Jolt Squeeze Pin Stripper — a versatile, triple-duty molder that can also be used as a Jolt Squeeze Pin Lift machine or Jolt Squeezer. The drawing mechanism can be operated on the exhaust of the squeezing stroke as a Stripper, or as a separate operation after squeezing as a Pin Lift. The machine handles simple, inexpensive pattern equipment, enabling you to put troublesome short-run jobs on a fast production basis.

●

The Milwaukee Jolt Squeeze Pin Stripper has conveniently located valves, is machined to close tolerances, and is accessible from all three sides. Squeeze head construction insures parallelism between pattern table and platen at all times.

Use it as a **JOLT SQUEEZE PIN STRIPPER**

Use it as a **JOLT SQUEEZE PIN LIFT**

Use it as a **JOLT SQUEEZER**

Get complete information on this modern, versatile TRIPLE DUTY molder. Write for Bulletin No. 110.

FIVE SIZES AVAILABLE

TYPE	125	145	165	195	215
Pattern Table Size	21" x 27"	24" x 30"	24" x 30"	28" x 38"	33" x 42"
Maximum Draw	8"	8"	8"	10"	10"
Max-Min. Flask Widths	12"— 21"	14"— 24"	14"— 24"	18" x 29"	20" x 33"
Squeeze Cyl. Dia.	12"	14"	16"	19"	21"

MILWAUKEE FOUNDRY EQUIPMENT CO.

3238 WEST PIERCE STREET • Cable Address "MILMOLDCO" • MILWAUKEE, WISCONSIN

"Store welding electrodes in a dry place— they will keep indefinitely if properly cared for"

Always keep electrodes in a dry place — on a clean shelf or rack, or at least off the floor. Don't expose them to moisture, keep them away from sweating pipes and open windows. If by accident a box of electrodes should get wet, spread them out to dry immediately.

Follow these simple precautions together with those enumerated at the right — fight waste to speed victory.

A booklet of shop bulletins illustrating "do's" and "dont's" has been prepared to help your welding operators get the most out of every electrode. We'll gladly send you as many copies as you can use.

WELDING ELECTRODES ARE SCARCE
Help Prevent Waste

- Do not bend electrodes unless absolutely necessary
- Use electrodes down to a 2-inch stub
- Fit joints properly before welding
- Make legs of fillet welds equal
- Make the face of fillet welds flat

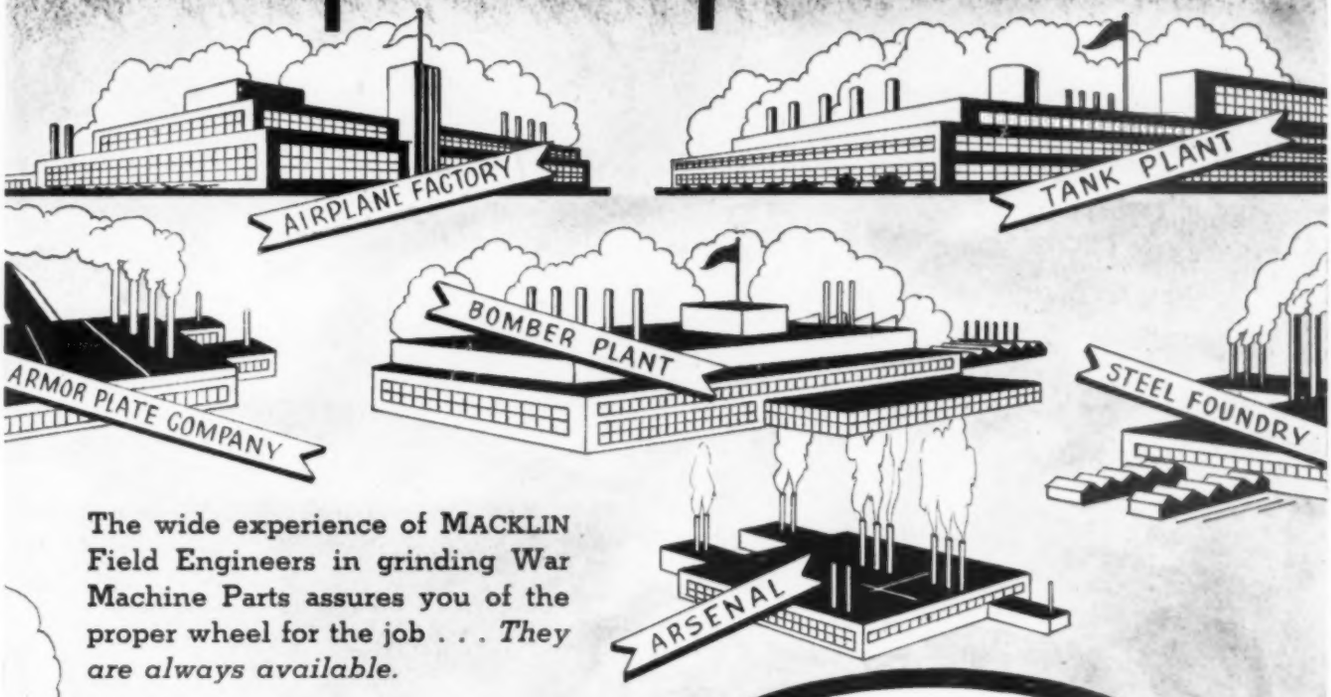
Air Reduction

General Offices:
60 EAST 42nd STREET, NEW YORK, N. Y.
IN TEXAS
MAGNOLIA - AIRCO GAS PRODUCTS CO.

AIRCO WILSON

OXYGEN IS PRODUCTION — *Don't Waste it!*

MACKLIN
Grinding Wheels



The wide experience of MACKLIN Field Engineers in grinding War Machine Parts assures you of the proper wheel for the job . . . *They are always available.*

MACKLIN COMPANY

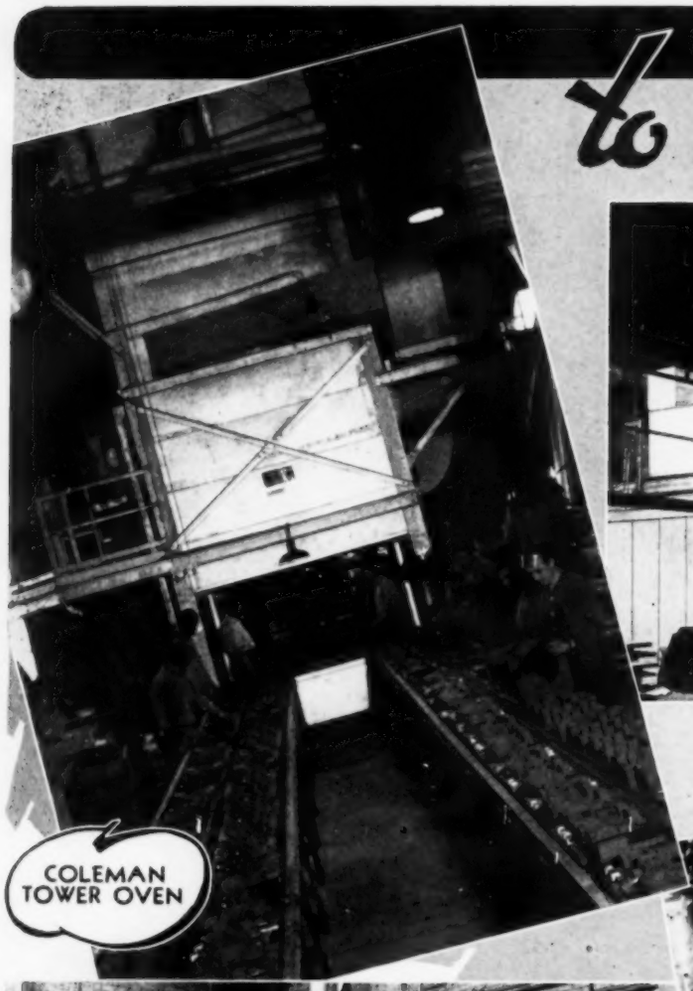
Manufacturer of Grinding Wheels

JACKSON, MICHIGAN, U. S. A.

Sales Offices

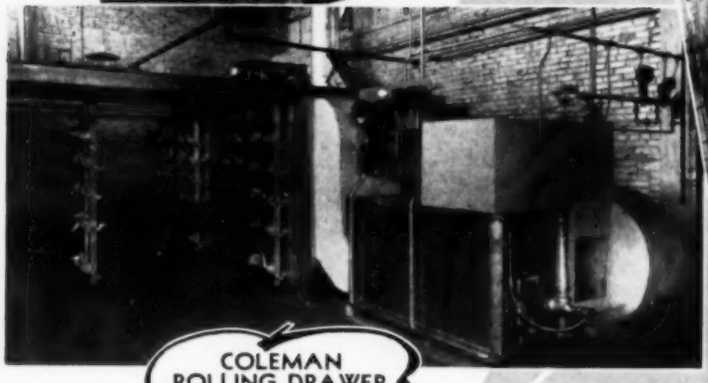
CHICAGO - NEW YORK - DETROIT - PITTSBURGH
CLEVELAND - CINCINNATI - MILWAUKEE
PHILADELPHIA

A RIGHT TYPE AND SIZE to DO YOUR WORK



COLEMAN TOWER OVEN

COLEMAN CAR TYPE CORE OVENS



COLEMAN ROLLING DRAWER CORE OVENS

COLEMAN TRANSRACK CORE OVENS

COLEMAN

of COLEMAN OVEN
FASTER, BETTER *and* CHEAPER

COLEMAN PORTABLE OVENS	For light production. Built-in shelf or rolling drawer types.
COLEMAN ROLLING DRAWER OVENS	For speedy baking of small and medium cores.
COLEMAN TRANSRACK OVENS	For operation with portable racks. Single or multiple rack capacity.
COLEMAN CAR TYPE OVENS	For both core baking and mold drying. No job too large.
COLEMAN TOWER OVENS	For high speed production. Amazing savings in floor space and production costs.
COLEMAN HORIZONTAL CORE OVENS	For large scale specialized core production.
COLEMAN CONTINUOUS MOLD OVENS	For high speed drying of molds for production demands.
COLEMAN PORTABLE MOLD DRYERS	For drying interior of heavy molds.

All Fuels Use any fuel economically available—Gas, Oil, Coke or Stoker coal.

Coleman Ovens offer you the benefit of over 37 years' experience in core baking and mold drying—and *7,000 successful installations* in all classes of foundry production.

World's Oldest and Largest Foundry Oven Specialists

THE FOUNDRY EQUIPMENT CO.
BUILDERS OF COLEMAN AND SWARTWOUT OVENS
CONTRACTING ENGINEERS AND MANUFACTURERS
CLEVELAND, OHIO

CORE *and* MOLD OVENS!

. . . and the Army and Navy, too!

WE cheered their heroism, their daring, their never-say-die spirit at Wake Island, for example.

Over and over in conversation, editorials, speeches, and every other form of verbal bouquet we told them how fine we thought they were. And how solidly we stood behind them.

But now comes the time when we've got to tell all that to the Marines and the Army and Navy in something more substantial than mere words.

Demonstration—not conversation—is called for now!

We've got to increase and maintain the club-houses which the men can use on their time off. 432 are already operating now. But that's not nearly enough.

We've got to help keep up their spirit by keeping boredom and monotony out of their lives. A fighter needs entertainment for his mind as well as guns for his hands, uniforms for his back, food for his stomach.

The USO camp shows are bringing the world's best entertainment to the armed forces. But we've only started!

Mobile units for troops in remote positions . . . troops-in-transit service at transportation stations . . . book gathering and distributing . . . these are just a few more expanding services the U S O is giving.

For the U S O—and you—are charged with the vital duty of helping keep up morale.

Fighting spirit is a real, a vital, a specific thing. An instrument of war like bullets, bombers, and tanks. Without it no victory can be won.

So it's your move now, Mr. and Mrs. America. That fountain pen you sign your check with is a machine gun today. Will you *start shooting?*

Send your contribution to your local campaign chairman or to National Headquarters, USO, Empire State Bldg., New York City.

★ USO ★

Large box type Cyclone for aluminum and magnesium heat treatment.

Small box type Cyclone for tempering tools and dies or other work that is handled individually.

Large vertical type Cyclone for production tempering. Its accuracy of heating and control also makes it ideal for aluminum and magnesium heat treatment.

Small vertical type Cyclone Furnace for heat treating small parts. Note basket in lower right hand corner.

THIS IS ABOUT THE SIZE OF IT!

SPECIFY STANDARD SIZES when ordering heat treating equipment. Valuable time is saved because drawings are available and all engineering has been completed. Man hours are saved by the elimination of special work in both engineering and the shop. And heat treating furnaces are sped to their destination to do their chosen work.

The dimensions listed below represent standard sizes of both vertical type and box type Lindberg Cyclone Furnaces. Each of these furnaces has been engineered and built and installed in the field.

The sizes embrace a range wide enough to handle practically any heat treating job for temperatures up to 1250°F.

LINDBERG VERTICAL TYPE CYCLONE *FUEL FIRED*

Utilizes the famous Lindberg 100% forced convection heating principle, available in both fuel fired and electrically heated units. Work is handled in baskets or on fixtures for accurate, uniform, low-cost tempering and precision heat treatment of aluminum and magnesium castings and forgings. Temperatures from 250°F. to 1250°F.

Dia.	Depth	Dia.	Depth	Dia.	Depth	Dia.	Depth	Dia.	Depth	Dia.	Depth
12"	16"	22"	30"	25"	40"	28"	60"	38"	30"	48"	38"
12"	100"	22"	36"	25"	48"	28"	72"	38"	36"	48"	48"
16"	20"	22"	38"	25"	60"	33"	28"	38"	48"	48"	60"
16"	22"	22"	48"	25"	160"	33"	36"	38"	60"	48"	78"
16"	26"	22"	60"	28"	28"	33"	40"	38"	72"	60"	72"
16"	28"	22"	72"	28"	36"	33"	48"	38"	84"	72"	24"
16"	32"	25"	20"	28"	42"	33"	60"	43"	48"	74"	72"
16"	36"	25"	30"	28"	48"	33"	72"	43"	54"	74"	86"
22"	26"	25"	36"	28"	50"	38"	28"	48"	28"	100"	44"

ELECTRICALLY HEATED

Dia.	Depth	Dia.	Depth	Dia.	Depth	Dia.	Depth	Dia.	Depth	Dia.	Depth
8"	10"	16"	26"	22"	80"	25"	66"	33"	120"	48"	36"
8"	12"	16"	28"	22"	100"	28"	28"	38"	36"	48"	60"
10"	14"	16"	32"	25"	20"	28"	36"	38"	48"	48"	72"
10"	20"	16"	48"	25"	30"	28"	48"	38"	60"	48"	84"
12"	16"	22"	26"	25"	36"	28"	54"	38"	72"	48"	96"
12"	18"	22"	36"	25"	40"	28"	60"	38"	84"	60"	60"
12"	20"	22"	48"	25"	42"	28"	72"	38"	120"	60"	72"
16"	20"	22"	60"	25"	48"	28"	84"	43"	42"	60"	84"
16"	24"	22"	72"	25"	60"	33"	36"	43"	48"	60"	93"

LINDBERG BOX TYPE CYCLONE *FUEL FIRED*

Is also heated by 100% forced convection and is also available in both fuel fired and electrically heated units. Recommended for tempering tools or dies or other work that is handled individually. Its heating accuracy and control make the box type Cyclone ideal for heat treating aluminum and magnesium castings, stampings and forgings. Temperatures from 250°F. to 1250°F.

W.	D.	H.	W.	D.	H.	W.	D.	H.	W.	D.	H.	W.	D.	H.
12"	16"	18"	24"	36"	18"	30"	72"	24"	36"	72"	36"	60"	96"	42"
15"	24"	18"	24"	48"	18"	36"	22"	24"	36"	92"	24"	72"	12'	42"
17"	24"	18"	24"	24"	20"	36"	36"	24"	42"	72"	36"	—	—	—
18"	36"	18"	30"	48"	40"	36"	54"	30"	48"	12'	60"	—	—	—
24"	24"	18"	30"	48"	48"	36"	72"	30"	54"	72"	36"	—	—	—

ELECTRICALLY HEATED

W.	D.	H.	W.	D.	H.	W.	D.	H.	W.	D.	H.	W.	D.	H.
12"	16"	18"	24"	24"	18"	36"	72"	24"	48"	72"	36"	60"	60"	42"
12"	12"	10"	24"	36"	18"	40"	96"	24"	48"	72"	48"	60"	10'	42"
15"	24"	18"	24"	36"	30"	42"	16'	36"	48"	72"	60"	60"	10'	60"
15"	24"	24"	24"	48"	18"	42"	16'	66"	48"	96"	36"	60"	16'	60"
15"	30"	18"	28"	28"	36"	42"	72"	36"	48"	10'	72"	66"	15'	66"
15"	48"	18"	30"	30"	24"	42"	84"	42"	48"	12'	72"	66"	16'	76"
18"	36"	18"	33"	34"	30"	42"	14'	36"	48"	16'	72"	66"	25'	76"
20"	24"	18"	36"	36"	24"	48"	60"	30"	48"	18'	72"	72"	96"	84"
20"	30"	18"	36"	48"	24"	48"	66"	48"	48"	22'	66"	72"	12'	42"
20"	36"	18"	36"	54"	30"	48"	72"	30"	52"	84"	20"	84"	96"	72"

LINDBERG ENGINEERING COMPANY

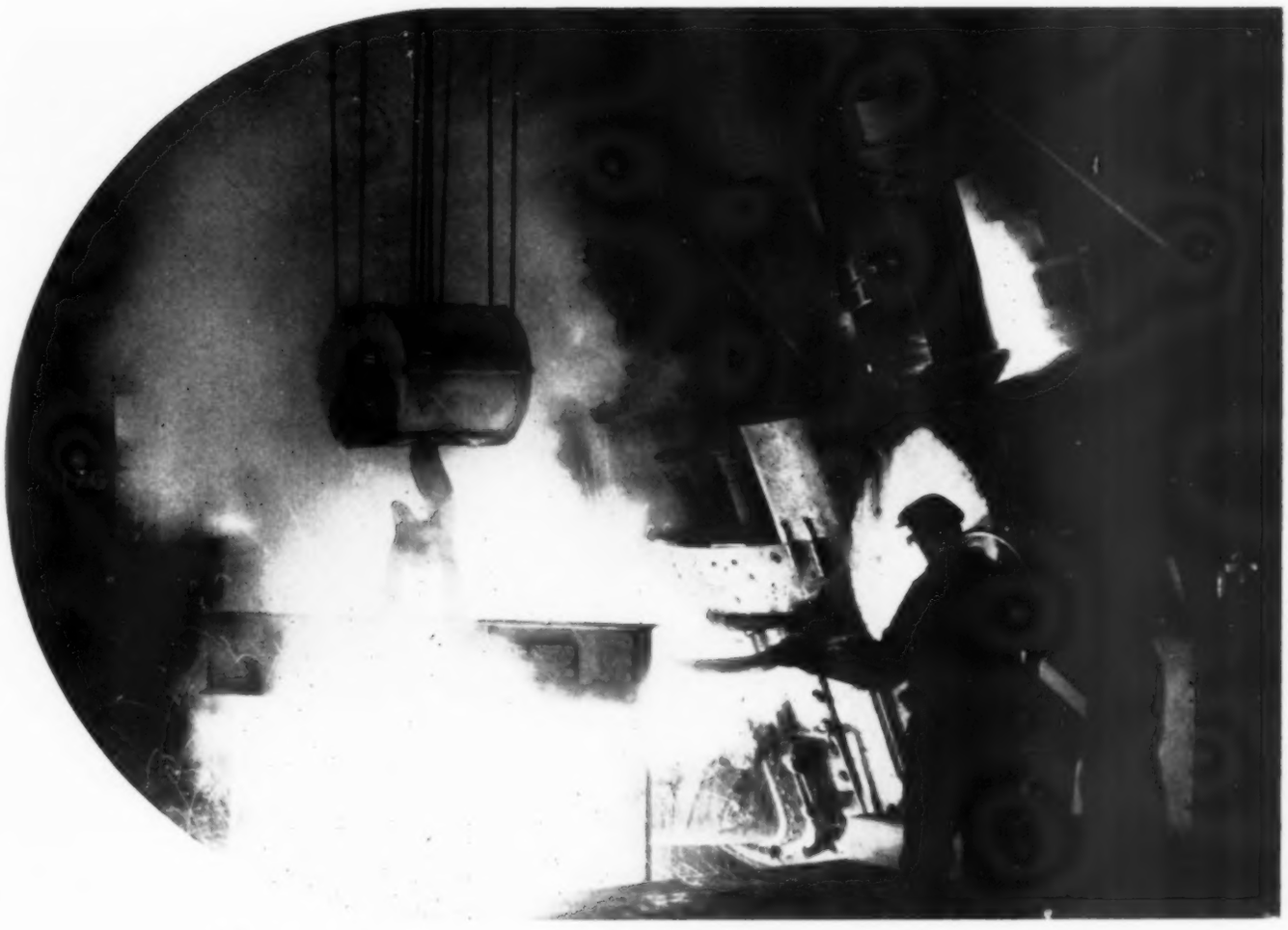
2453 WEST HUBBARD STREET • CHICAGO

HYDRYZING FOR SCALE-FREE AND DECARB-FREE HARDENING

LINDBERG FURNACES

SUPER-CYCLONE FOR HARDENING, NORMALIZING, ANNEALING, TEMPERING, NITRIDING

CHRISTMAS 1942
...The season's greetings from Globe Iron Co. have always been given in sincerity, but this year they mean more than ever before. They mean that everyone here is bending every effort to produce more superior irons for our nation's arms to speed the complete victory that must be America's.
GLOBE IRON CO.
JACKSON, OHIO

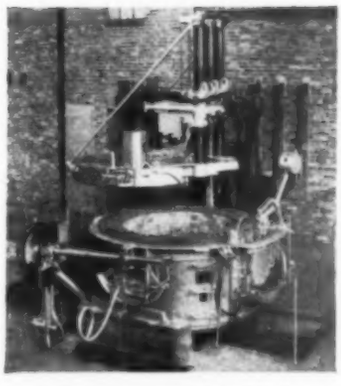


Moore Rapid **Lectromelt** *Furnaces*

For *Faster* STEEL MELTING

Top charge type Lectromelt Furnaces increase foundry production. Their modern design permits faster charging and saves time between heats. Operating economies include more tonnage per man hour, lower consumption of power, and savings in electrode and refractory costs. Lectromelts are ruggedly built and give long and satisfactory service with a minimum of maintenance.

Both top charge and door charge types are available in sizes ranging from 100 tons to 25 pounds capacity. Detailed information sent on request. Write today.



Top charge Lectromelt Furnace with roof raised and rotated to one side ready for quick charging by a drop bottom charge bucket.

PITTSBURGH LECTROMELT FURNACE CORPORATION

Pittsburgh, Pennsylvania

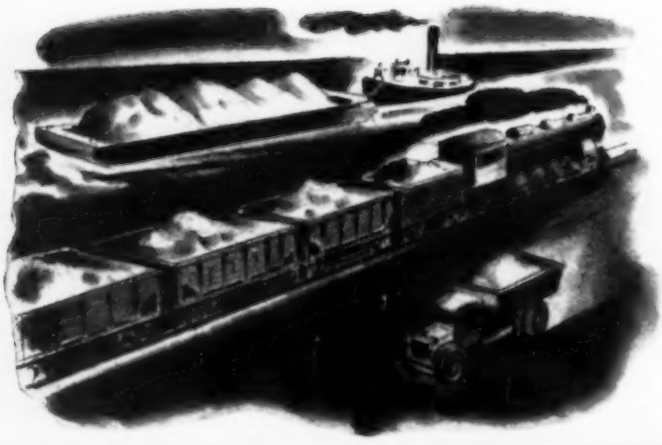
HYDRO-BLAST

releases workers
for other war work

HYDRO-BLAST

recovers valuable sand
and saves scrap

HYDRO-BLAST



releases the supply lines
to our war machine

Today, forty Hydro-Blast Systems are knocking out cores, cleaning castings and recovering core sand in American war plants

These 40 **Hydro-Blasts** are saving invaluable man hours, irreplaceable transport ton miles and costly labor turnover.

A **Hydro-Blast System** in one steel foundry, making the most exacting naval work, is cleaning castings to microscopic cleanliness and decoring them while washing, classifying and drying five tons per hour of previously wasted sand at a cost of less than 75 cents per ton delivered in the bins above the sand mill. This 75 cents per ton includes labor, power, water and maintenance. Eighty-five per cent of the sand input by weight is recovered.

A recently completed survey of an Eastern foundry producing highly essential castings disclosed that 40 men are required in the cleaning room to maintain the company's war production schedule. Further, these 40 men represent a labor turnover of 400 on this job during the past six months, chiefly because the job is irksome and dusty.

A **Hydro-Blast System** and two unskilled laborers can perform that work faster, better and cheaper, release many able-bodied men for other war effort or military service and save many ton miles of transport while improving working conditions for the workmen.

Hydro-Blast Systems in general are recovering approximately 160 carloads of sand per day in American foundries, saving an astronomical number of freight ton miles to increase tremendously the available carrier capacity.

Think what so many able-bodied men, plus multitudinous tons of invaluable materials, plus millions of transport ton miles, plus greatly improved working conditions can mean.

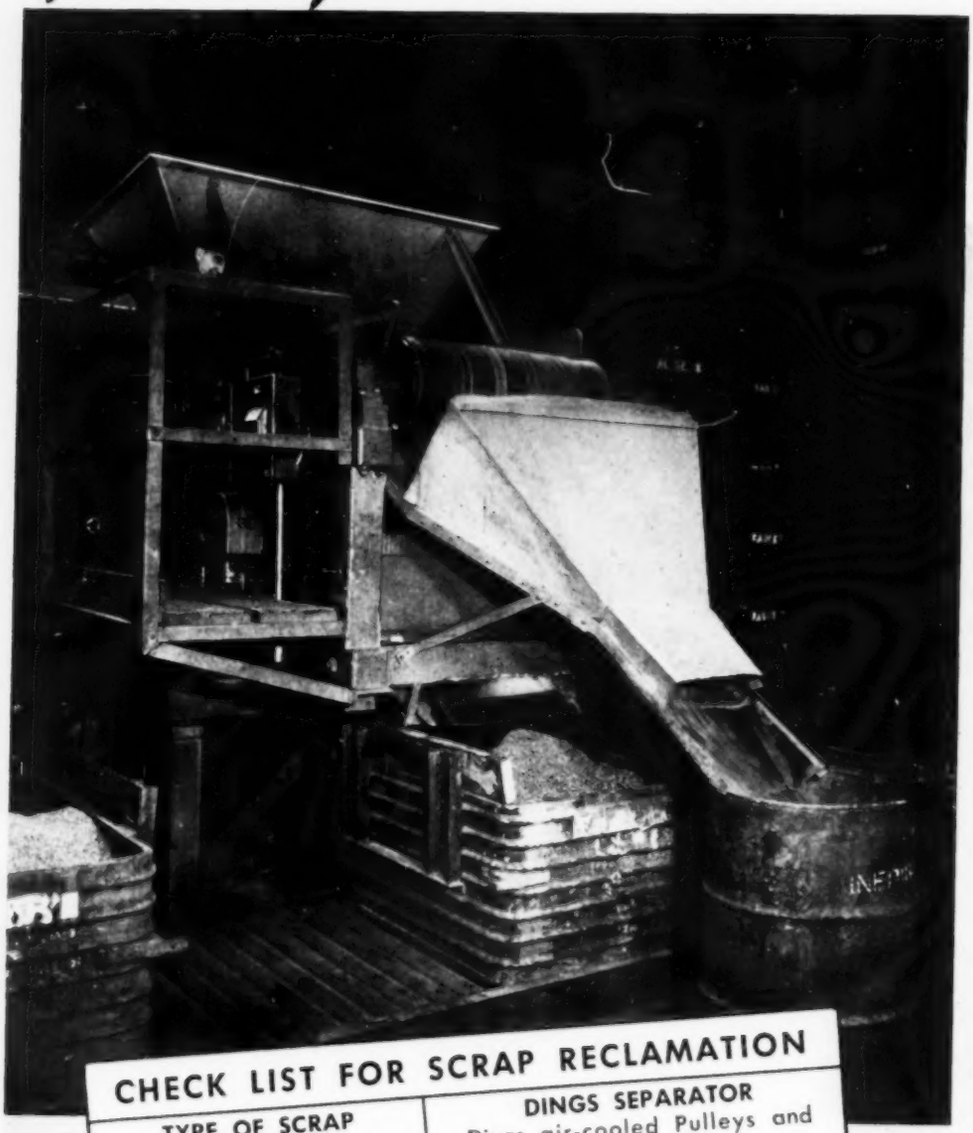
Perhaps your foundry can make a noteworthy war contribution while reducing your production costs.

THE HYDRO-BLAST CORPORATION

2550 NORTH WESTERN AVENUE • CHICAGO

Speed up SCRAP RECLAMATION

with DINGS MAGNETIC SEPARATORS



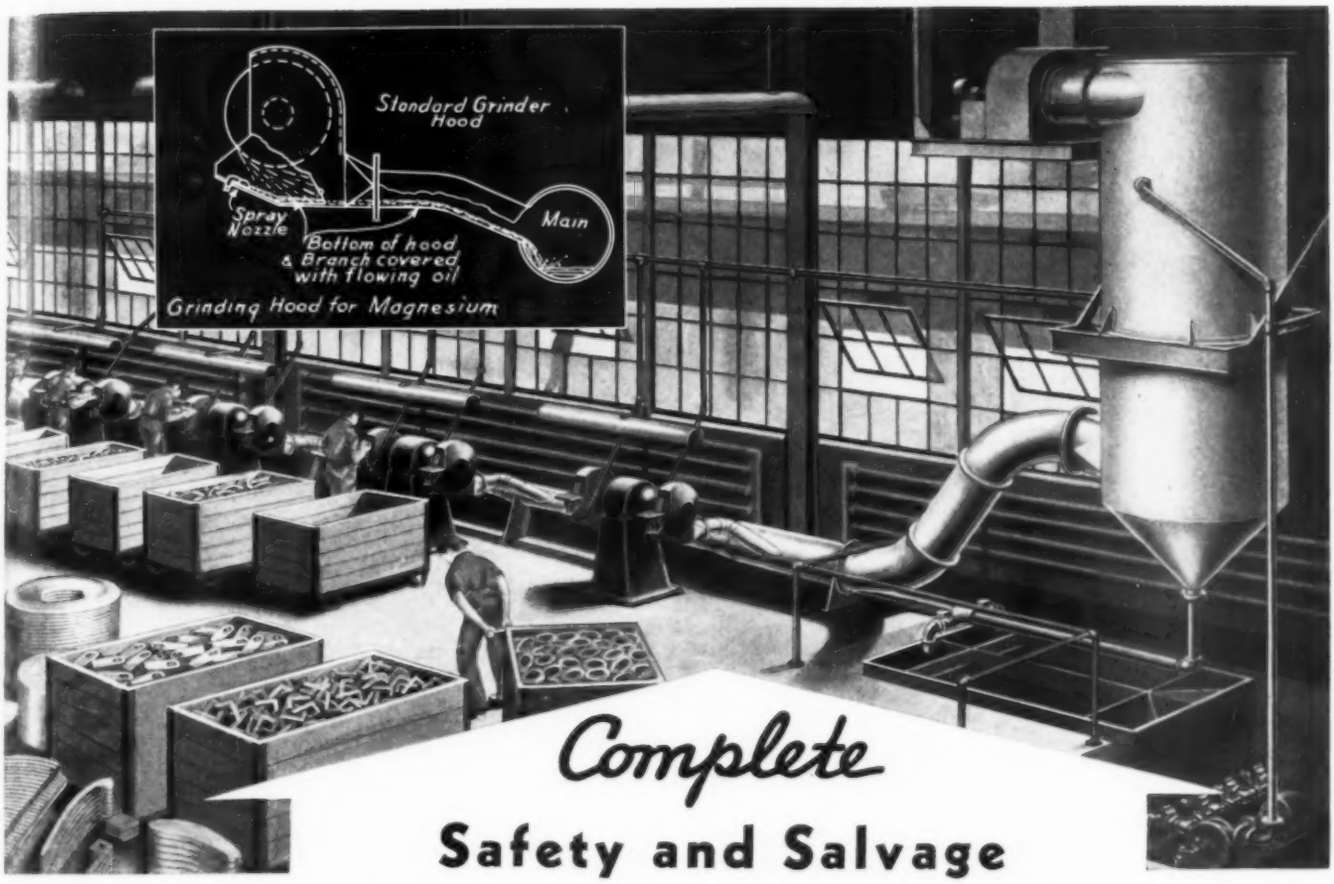
THE Dings High Intensity Magnetic Separator illustrated, installed at the Whiting, Indiana, plant of Federated Metals Division, is used for high capacity purification of non-ferrous turnings and borings. One of several types of Dings Separators installed, it is typical of the equipment Dings offers to speed up scrap reclamation for the war effort.

No matter what your scrap reclamation problem is, you'll find modern Dings equipment designed to handle it. Installations can be made to fit the most special requirements. For better, faster, labor-saving scrap reclamation, consult Magnetic Separation Headquarters now. Ask for a copy of Magnetic Alchemy, 8 page bulletin on Dings equipment for the metal industries.

DINGS MAGNETIC SEPARATOR CO.
516 East Smith Street
Milwaukee, Wisconsin

CHECK LIST FOR SCRAP RECLAMATION	
TYPE OF SCRAP	**DINGS SEPARATOR**
1. Removal of contaminating iron from non-ferrous parts and pieces.	Dings air-cooled Pulleys and Pulley Type Separators for capacities to over 15,000 cu. ft. per hr. Portable models available.
2. Purification of non-ferrous turnings and borings.	Dings Drum Type Separators with capacities comparable to pulleys of similar size. Type DA Dual Pulley Type Separators with 2 separation points. Revolving Disc Type M Separators. Successful for over 40 years.
3. Intimately entangled scrap such as results when babbitted pillow blocks are bored or grooved for lubrication channels.	A new type separator to do a job once impossible! Combines mechanical and magnetic agitation to pull tangled ferrous and non-ferrous particles loose from each other.

Dings MAGNETIC SEPARATION HIGH INTENSITY



Complete

Safety and Salvage

of Dust for Magnesium Foundries

Since 1937, Schneible engineers have been improving magnesium foundry dust collecting procedure. *Today, Multi-Wash Collectors are the safest, most practical salvage return units for ventilating all grinding, sawing, burring, polishing and finishing operations.*

With the Multi-Wash method, all dust is immediately rendered harmless by surrounding each dust particle with a light, high flash mineral oil in the hoods and ducts and in the collector. No magnesium is lost—all dust is salvaged for re-use.

Maximum safety, low initial operating and maintenance costs and complete elimination of the dust handling hazard are fully developed features. No moving parts in the dust stream, no parts to burn, clog, rapidly wear or become inoperative are design features.

Let us furnish you with complete details on Schneible Dust Collectors and Down-Draft Grinding Benches for magnesium foundries. Send for Bulletin No. 1142.

All magnesium foundry operators should have this folder

CLAUDE B. SCHNEIBLE COMPANY

3953 Lawrence Ave., Chicago

Offices in Principal Cities

SCHNEIBLE

PANELS OF *No-Thru* METAL CONSTRUCTION

...one of the Many Reasons for the High Efficiency of NEWCOMB • DETROIT *Ovens*

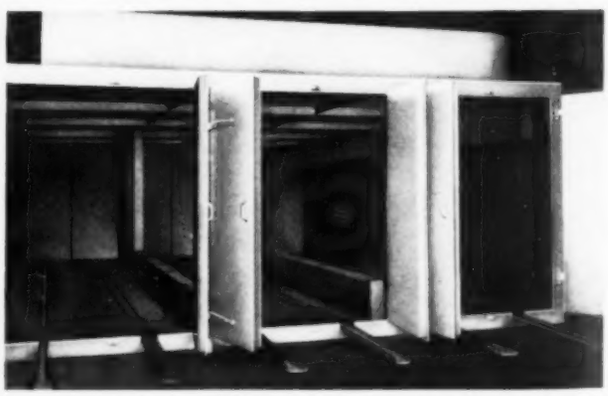
Newcomb-Detroit Ovens are today in use in many diversified industries throughout the country. Each has been engineered and built for specific methods of production.

Among many exclusive Newcomb-Detroit oven features are the panel units used in built-up type ovens. These panels are made of auto body steel and feature the well-known "No-Thru" metal construction. All panels have telescoping joints. Every unit is completely insulated with either non-settling mineral insulating wool or glass wool of the exact required thickness. All exposed heat ducts are also completely insulated. The standard panel construction permits complete dismantling of the oven at any time for rearranging or enlarging as production changes occur.

Special design and construction features . . . all contributing to greater production efficiency . . . are to be found in the many types of ovens and furnaces produced by Newcomb-Detroit. The heating system can be designed to suit any requirements. In addition to panel type heat-seal ovens, Newcomb-Detroit builds batch type ovens . . . high and low temperature drying ovens . . . core and mold drying ovens . . . annealing ovens . . . normalizing and forging furnaces . . . and similar equipment for special purposes.

Newcomb-Detroit engineers are always glad to offer recommendations—without obligation on your part—as to the equipment best suited to your requirements.

★ A typical Newcomb-Detroit Panel Type Heat-Seal Oven installation equipped with overhead conveyor system.



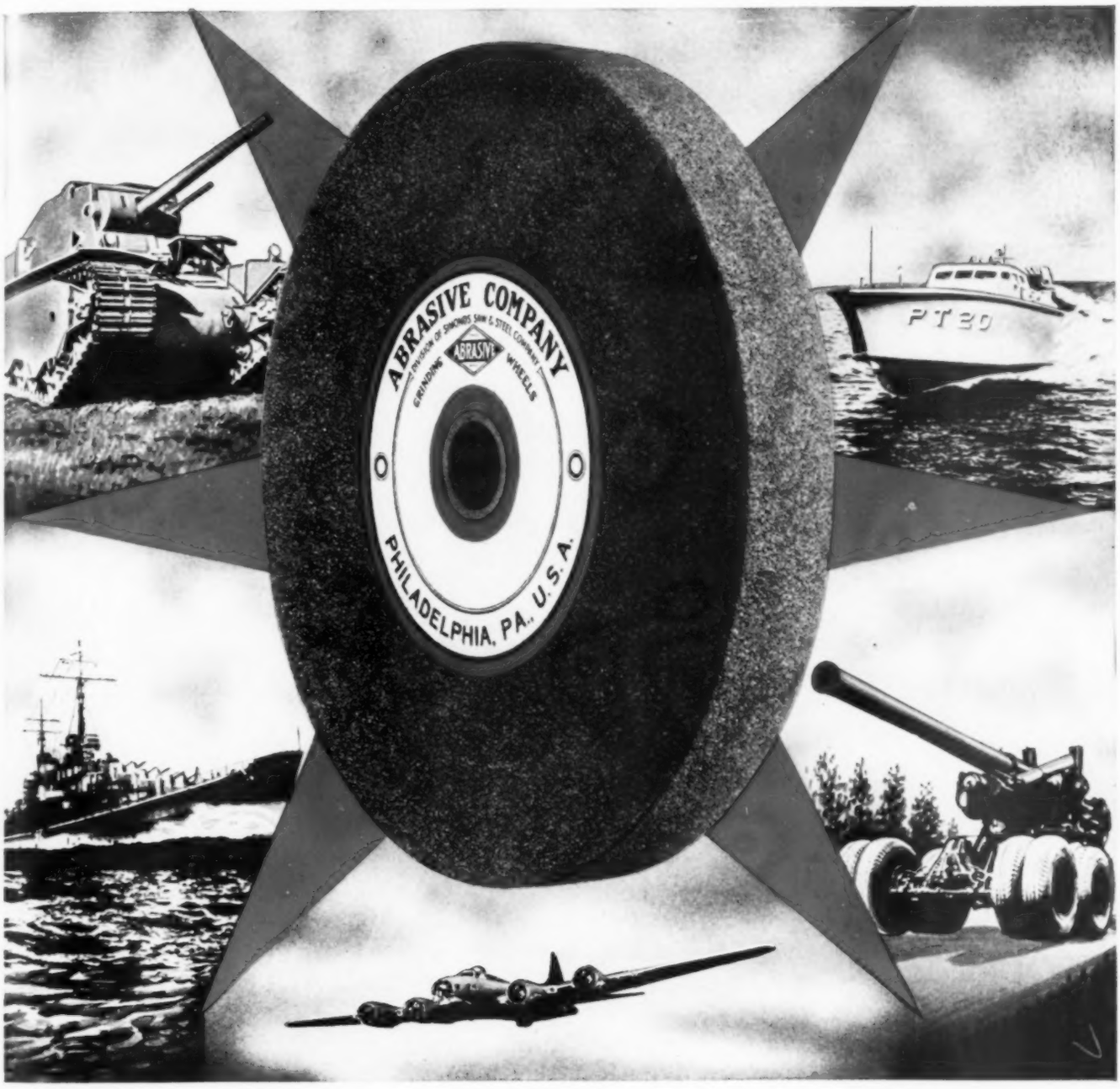
★ Newcomb-Detroit Batch Type Ovens, such as that illustrated, are widely used for moisture drying, paint and enamel drying, core baking, armature baking and aging.

WE ARE ALSO IN A POSITION TO SUPPLY INFRA-RED DRYING EQUIPMENT

NEWCOMB-DETROIT COMPANY, INC.

5751 RUSSELL STREET *Established 1912* DETROIT, MICHIGAN

Dust Collectors • Paint Spray Booths • Drying Ovens • Metal Parts Washers and Rust Proofing Systems • Exhaust and Ventilating Systems • Other Sheet Metal Equipment



Production speeds Victory! Speed production with

ABRASIVE COMPANY GRINDING WHEELS

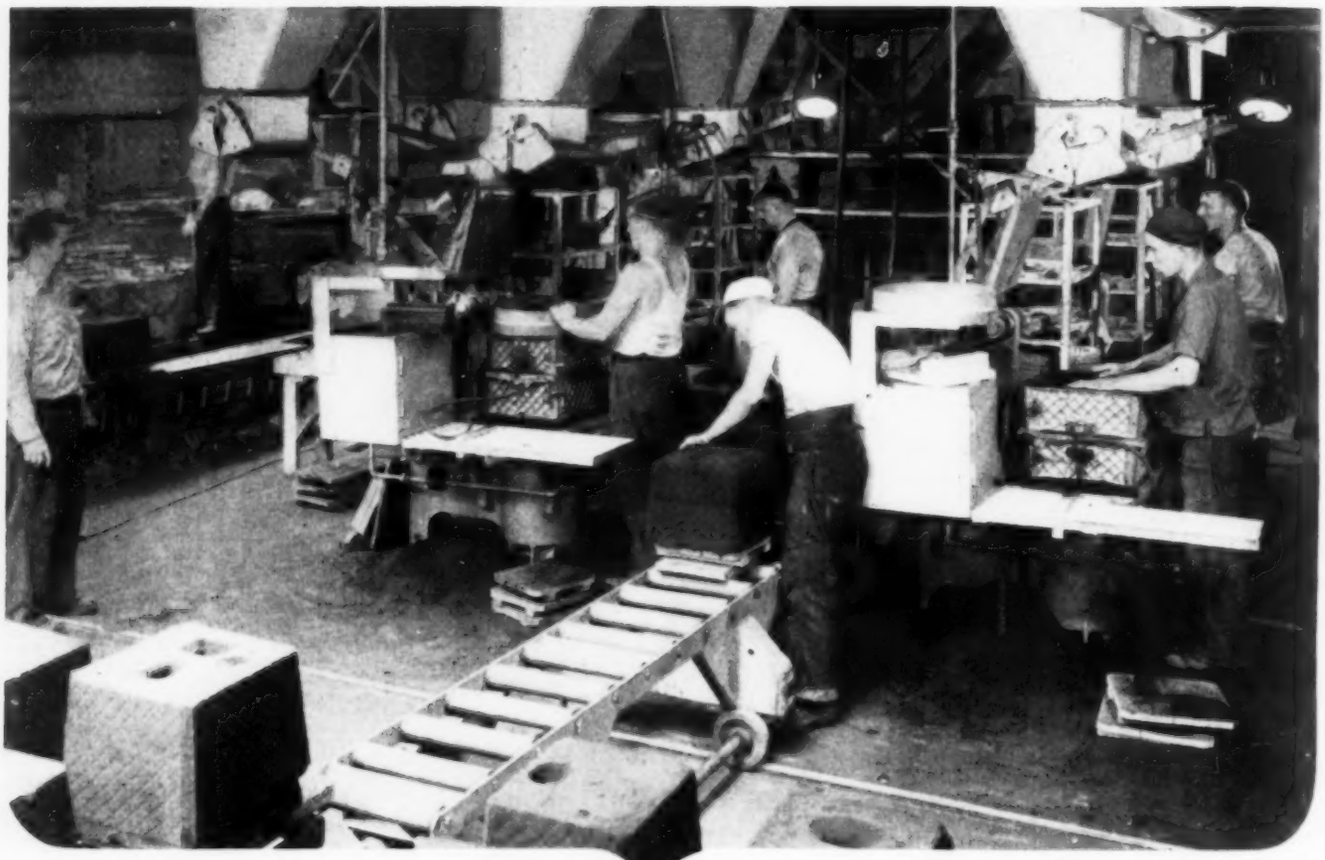
1892 FIFTY YEARS OF SERVICE TO INDUSTRY 1942

ABRASIVE COMPANY

DIVISION OF SIMONDS SAW AND STEEL CO.

TACONY & FRALEY STS., PHILADELPHIA, PA. • DISTRIBUTORS IN ALL PRINCIPAL CITIES

TREBLE THE PRODUCTION OF EVERY MAN?



★ Now, more than ever, it is essential that every man be equipped to produce a maximum amount of work for War equipment.

Herman machines in your molding department will enable you to treble, yes, often quadruple or quintuple the work of your molders with proper departmental layout. It makes no difference if your work is large or small, intricate or simple, Herman equipment will make it better, and faster.

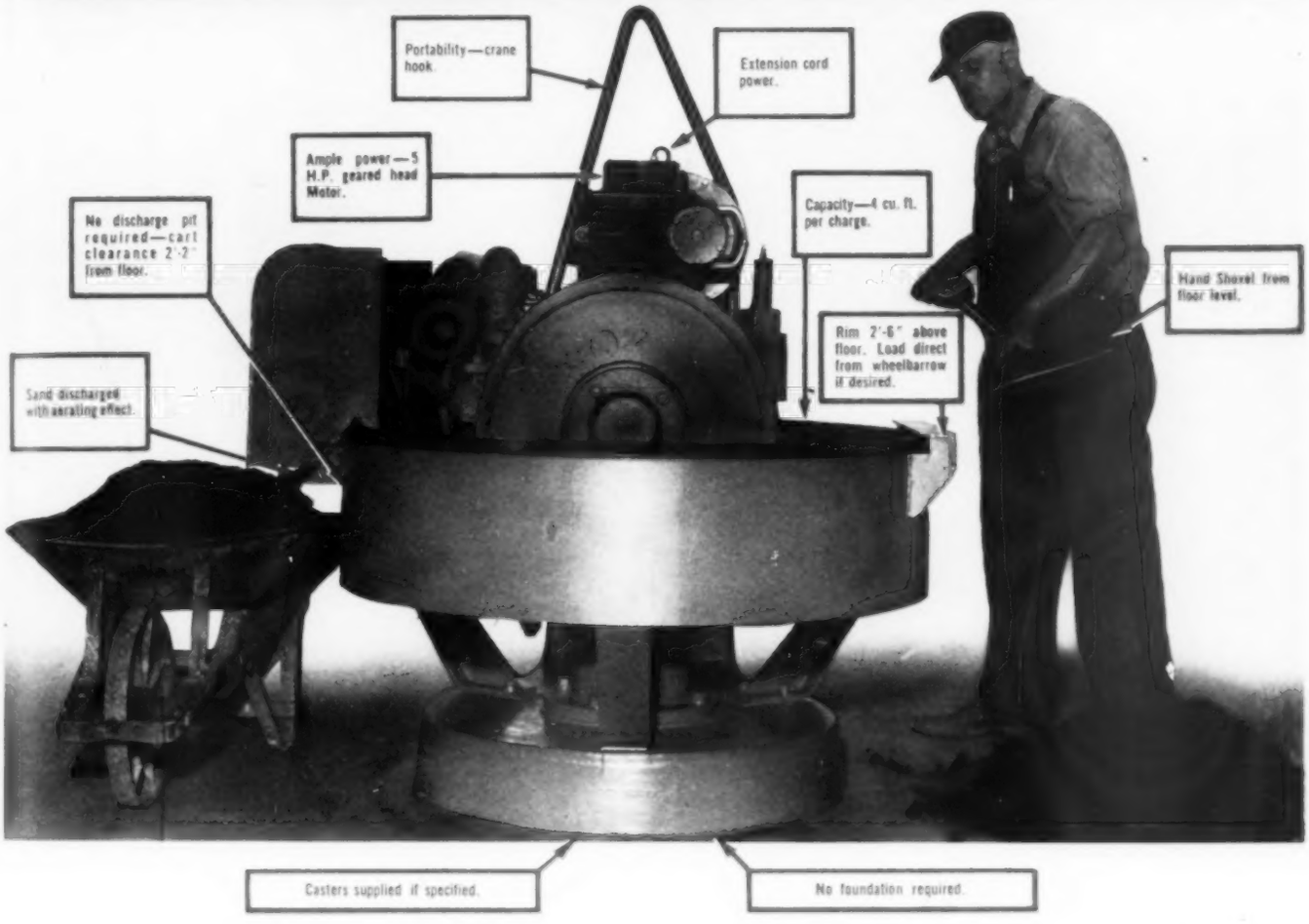
These statements are, of course, but generalities. For real proof, we cordially invite you to call for one of our experienced foundry engineers who will gladly study your problems with you and make recommendations for improvements in your molding department. No obligation.

MOLDING HERMAN MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

The CLEARFIELD "404" MIXER

SELF-CONTAINED SINGLE ONE UNIT LEVEL . . . COMPLETE WITH BASE AND DRIVE


Portability—crane hook.
Extension cord power.
Ample power—5 H.P. geared head Motor.
Capacity—4 cu. ft. per charge.
No discharge pit required—cart clearance 2'-2" from floor.
Hand Shovel from floor level.
Rim 2'-6" above floor. Load direct from wheelbarrow if desired.
Sand discharged with aerating effect.
Casters supplied if specified.
No foundation required.

READILY PORTABLE FOR EASY OPERATING CONDITIONS . . . REQUIRES NO HOISTING AND CONVEYING APPARATUS . . . NO DISCHARGE PIT!

Mixing unit efficiency plus cost of operation is greatly affected by time and labor required for sand feeding and disposal. Moderate tonnages do not always warrant complete conveying systems, and in many foundries, sand preparation may be built around the portability of the mixing unit.

For such usage, the Clearfield "404" definitely leads the field with its wide range of usefulness. Small, compact, and of low-power consumption, the Clearfield "404" is especially suitable either for small foundries where a single mixing unit is employed or in the larger foundries where work is departmentalized for several classes of sand.

The many enumerated Clearfield "404" features are justified proof of convenience and economy together with an absolute minimum of auxiliary equipment.

Write for
CLEARFIELD "404" DATA!

CLEARFIELD MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U. S. A.

Make Your Selection From This List—

SIDE ROD TYPE—Portable or Stationary

	Squeeze Piston diameter	Jolt Piston diameter	Clearance between Side Rods	Pattern Draw Adjustable
10″-32″ Jolt Squeezer	10″	4″	32″	
12″-38″ Jolt Squeezer	12″	5″	38″	
16″-42″ Jolt Squeezer	16″	6″	42″	
10″-32″ Universal Jolt Squeezer	10″	4″	32″	3″ to 6″
12″-38″ Universal Jolt Squeezer	12″	5″	38″	3″ to 6″

Also Adams Hand Squeezers—30″, 34″ or 38″ between side rods—Portable or Stationary.

THE ADAMS COMPA

MOLDING MACHINES · FLASK

Adams Molding Machines

POST TYPE — Portable or Stationary

	Squeeze Piston diameter	Jolt Piston diameter	Pattern Draw, Adjustable
10" Post Type Jolt Squeezer	10"	4"	
12" Post Type Jolt Squeezer	12"	5"	
10" Post Type Universal Jolt Squeezer	10"	4"	3" to 6"
12" Post Type Universal Jolt Squeezer	12"	5"	3" to 6"

Also manufacturers of Snap Flasks, Slip Flasks, Jackets, Bands, Presser Boards, Bottom Plates, Upsets, Match Frames, Tubular Sprue Cutters and Vibrators.

NY · DUBUQUE, IOWA · U.S.A.

EQUIPMENT — Established 1883

SAFCO

CORE OILS

Add Wings to Production Schedules!

Increased production — — — fewer losses
two vital needs — — — one tough job!

Under pressure and when meeting heartbreaking schedules, there's no time for production losses—*call for a specialist!*—call for a SWAN-FINCH field man.

They are capable and trained men with years of highly specialized experience gained thru solving problems in many and varied kinds of foundries. They are ready and able to make recommendations and tests—*right on the job.*

That's why, everyday more men responsible for foundry production, men who have a reputation for "getting things done" are specifying 'SAFCO' core oils.

It will pay you real dividends to get better acquainted with the Swan-Finch field representative who covers your district. Capable and able, they are constantly devising *new* ways and means for stepping up production.

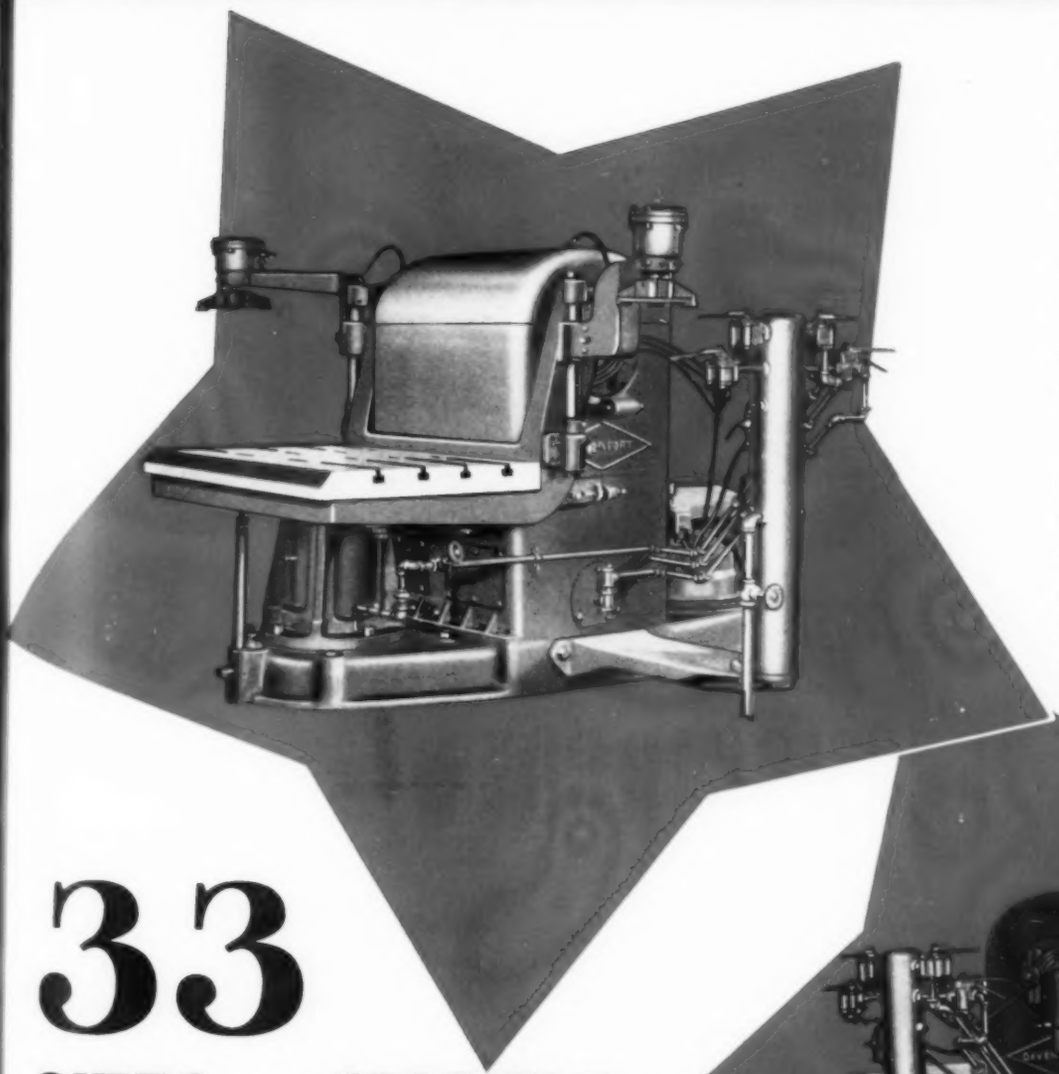
For instance meet Arthur Thuren. He is one of our highly trained and experienced fieldmen. ASK US TO HAVE HIM CALL—NO OBLIGATION.

SWAN-FINCH OIL CORPORATION

Offices		Plants	
New York City—Executive Offices	R.C.A. Building, West	Newark, N. J.	120 Lister Avenue
Chicago, Ill.	201 North Wells Street	Chicago, Ill.	5849 West 66th Street (Clearing, Ill.)
Detroit, Mich.	2596 Hart Avenue	Detroit, Mich.	2596 Hart Avenue

★ THE MODERN FOUNDRY MOLDING MACHINE ★

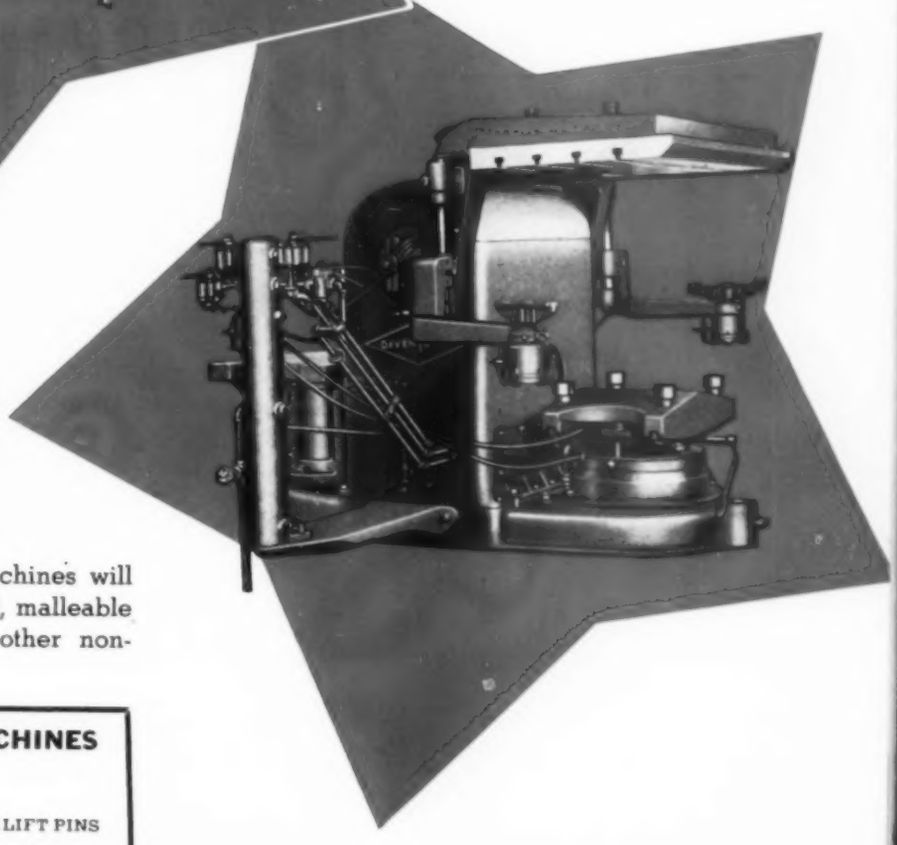
"DAVENPORT"



"DAVENPORT"
JOLT ROLLOVER DRAW
NOS. 28 AND 34, MODEL A
JOLT POSITION

"DAVENPORT"
JOLT ROLLOVER DRAW
NOS. 28 AND 34, MODEL A
DRAW POSITION

The "Davenport" Jolt Rollover Draw, Model A, is probably the finest molding machine built today. This model is the ultimate development of engineering and designing skill from over thirty years of building the line of "Davenport" Foundry Equipment.



33

SIZES and MODELS TO MEET YOUR REQUIREMENTS

The "DAVENPORT" line of Foundry Molding Machines will meet practically every foundry requirement of steel, malleable and gray iron castings, also of magnesium and other non-ferrous castings.

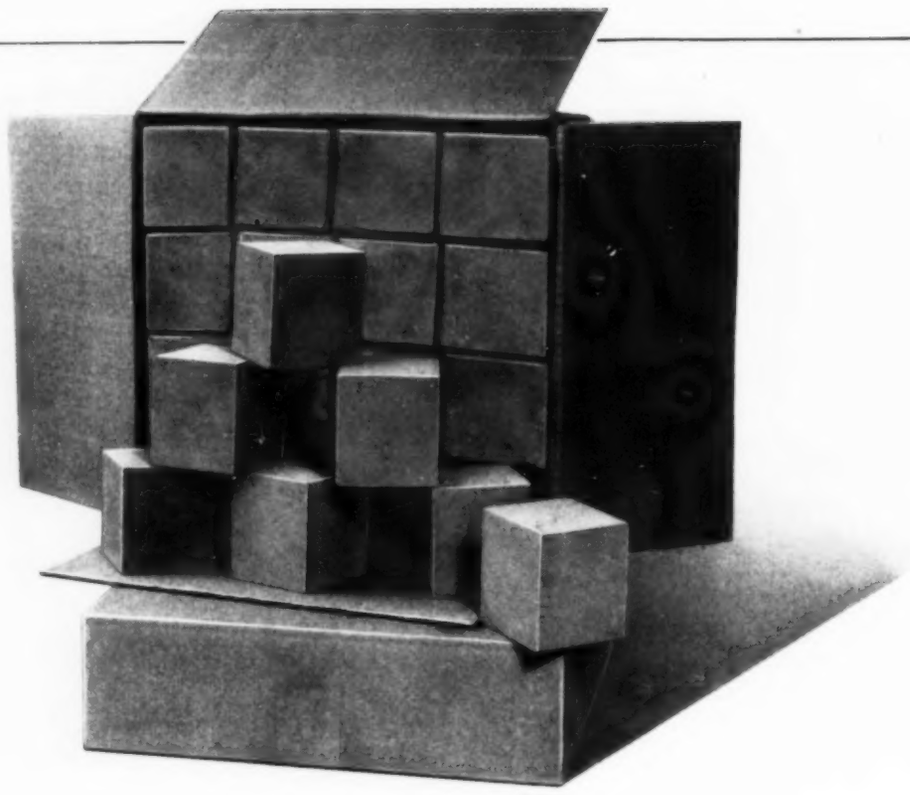
"DAVENPORT" LINE OF MOLDING MACHINES

JOLT ROLLOVER DRAW MACHINE
Model SA (Seven sizes)—Capacity from 750 to 12,000 lbs.
Model A (Six Sizes)—Capacity from 1,000 to 12,000 lbs.

JOLT STRIPPER OR PUSH-OFF MACHINES WITH ADJUSTABLE LIFT PINS
Six Sizes—capacity from 1,000 to 10,000 lbs.

PLAIN JOLT MACHINES—Fourteen sizes—Capacity from 200 to 25,000 lbs.

DAVENPORT MACHINE & FOUNDRY CO.
DAVENPORT IOWA, U.S.A.



Report to foundry operators on

"FERROCARBO"

REG. U. S. PAT. OFF.

● Since its introduction, the consumption of "Ferrocarbo", in briquette form as a cupola addition and as grain for ladle and furnace additions, has steadily increased. Here are some of the reasons why:

1. *Oxides are eliminated because "Ferrocarbo" is a powerful deoxidizer or degasifier.*
2. *The fluidity of the iron is increased. This results in denser finer grained, higher strength castings.*
3. *Castings of "Ferrocarbo" treated iron can be machined at high speeds—take an excellent finish. Moreover, they are strong, tough and uniform—are free from hard spots and show greater resistance to wear and impact.*
4. *There are fewer rejected parts.*
5. *High quality iron is produced economically.*

War needs have created an unprecedented demand for "Ferrocarbo". Even greatly enlarged production facilities cannot satisfy this demand. This situation is naturally disappointing to us, but like everyone else we are bending every effort to fill the requirements of the war industries.

When conditions return to normal we shall be in a better position than ever to supply all needs for "Ferrocarbo". Meanwhile we will continue to fill orders from the war industries to the best of our ability.

REFRACTORY CARBORUNDUM PRODUCTS

THE CARBORUNDUM COMPANY, REFRACTORY DIVISION, PERTH AMBOY, N. J.

REG. U. S. PAT. OFF.

District Sales Branches: Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh. Distributors: McConnell Sales and Engineering Corp., Birmingham, Ala.; Christy Firebrick Company, St. Louis, Mo.; Harrison & Company, Salt Lake City, Utah; Pacific Abrasive Supply Co., Los Angeles, San Francisco, Calif.; Denver Fire Clay Company, El Paso, Texas; Smith-Sharpe Co., Minneapolis, Minn.

Distributors: Kerchner, Marshall & Co., Pittsburgh and Cleveland; Miller and Company, Chicago, St. Louis and Cincinnati

(Carborundum and Ferrocarbo are registered trade-marks of and indicate manufacture by The Carborundum Company)

EXTRA · DAILY—TIMES ·

GOOD NEWS

For Furnace and Boiler Operators

1 Ramtite Plastic Refractory is available for shipment NOW—No waiting.

2 Services of Ramtite Engineers and construction crews are available on short notice.

THE RAMTITE CO. *Offers the following:*

1 Immediate shipments of Ramtite—which is first quality fire brick in plastic form—compounded of the finest refractories, each contributing certain desirable characteristics. It is easily pounded into any desired shape and sets with the first firing.

2 Complete boiler settings and Boiler setting repairs.

3 Sectionally supported walls.

4 Suspended Arches.

5 Insulated suspended walls.

6 Air cooled suspended walls.

7 Special Linings for Furnaces (melting, heat treating, forge) Soaking pit covers, ladles, ladle covers, etc.

8 *ENGINEERING AND DESIGN*

Ramtite engineers are prepared to study your problems—design new installations or recommend changes in existing installations which will improve operation or increase output.

9 *CONSTRUCTION CREWS*

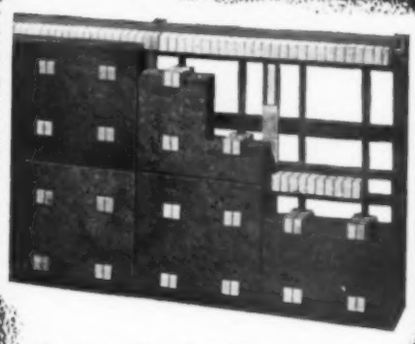
Ramtite experienced construction crews are located in principal industrial centers and are trained to erect anything of Ramtite design.

Tell us your troubles

. . . involving refractories or their application to any of the points mentioned in paragraphs No. 2 to 7 above. Ramtite engineers will study them and make complimentary recommendations.

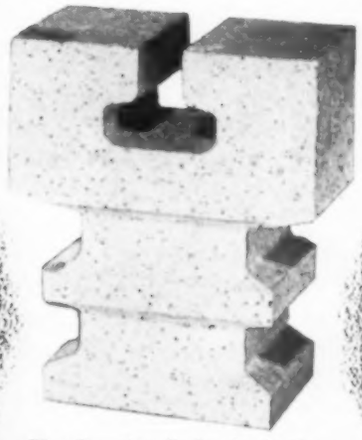
THE RAMTITE CO.
DIVISION OF THE S. OBERMAYER CO.
2567 West 18th Street
CHICAGO, ILL.

RAMTITE



Section of a Ramtite suspended air cooled wall.

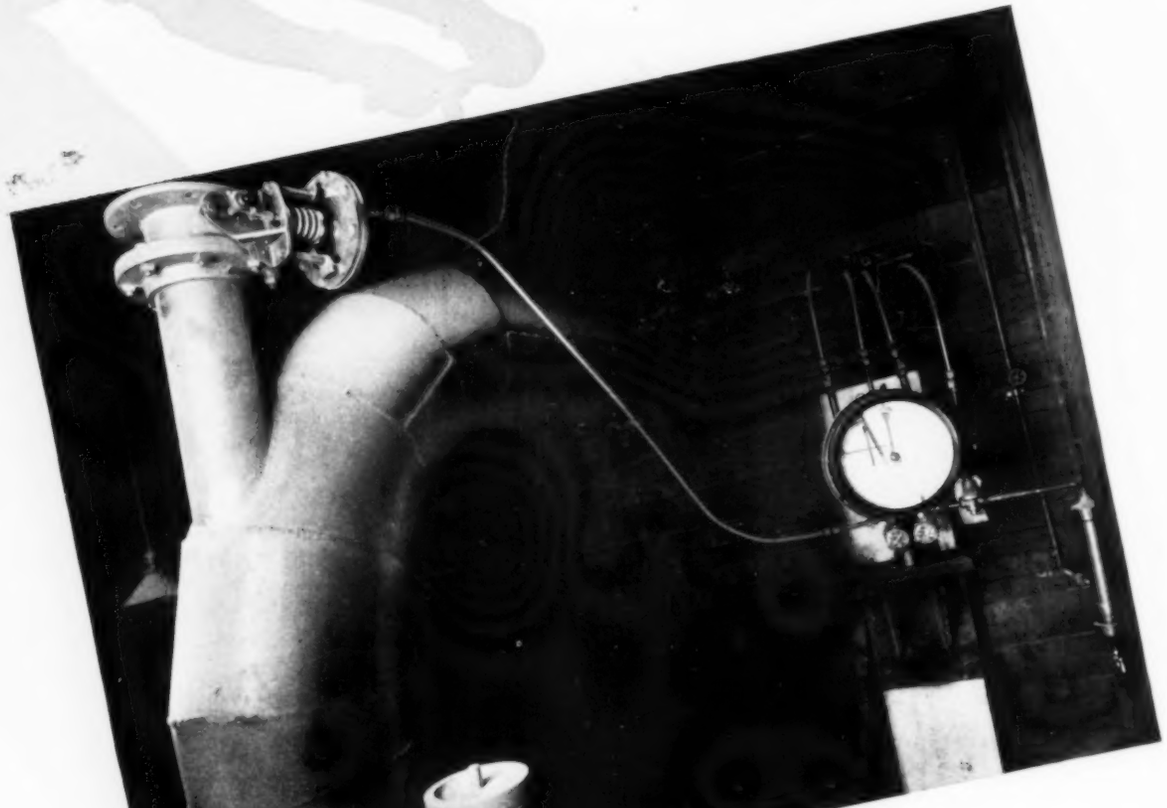
Suspended Ramtite construction used in a furnace roof.



The Ramtite Safe-tie Anchor.

This "Phantom Foundryman"

INCREASES FOUNDRY OUTPUT!



Typical installation of Foxboro Air Weight Controller. Simple setting of the control point maintains desired blast *by weight.*

Easily-installed Foxboro Controller keeps heats uniform and hotter . . . eliminates pigging and rejects

A simple installation makes any cupola produce added tonnage of good castings per day. All that is needed is Foxboro Air Weight Control equipment on the blast line!

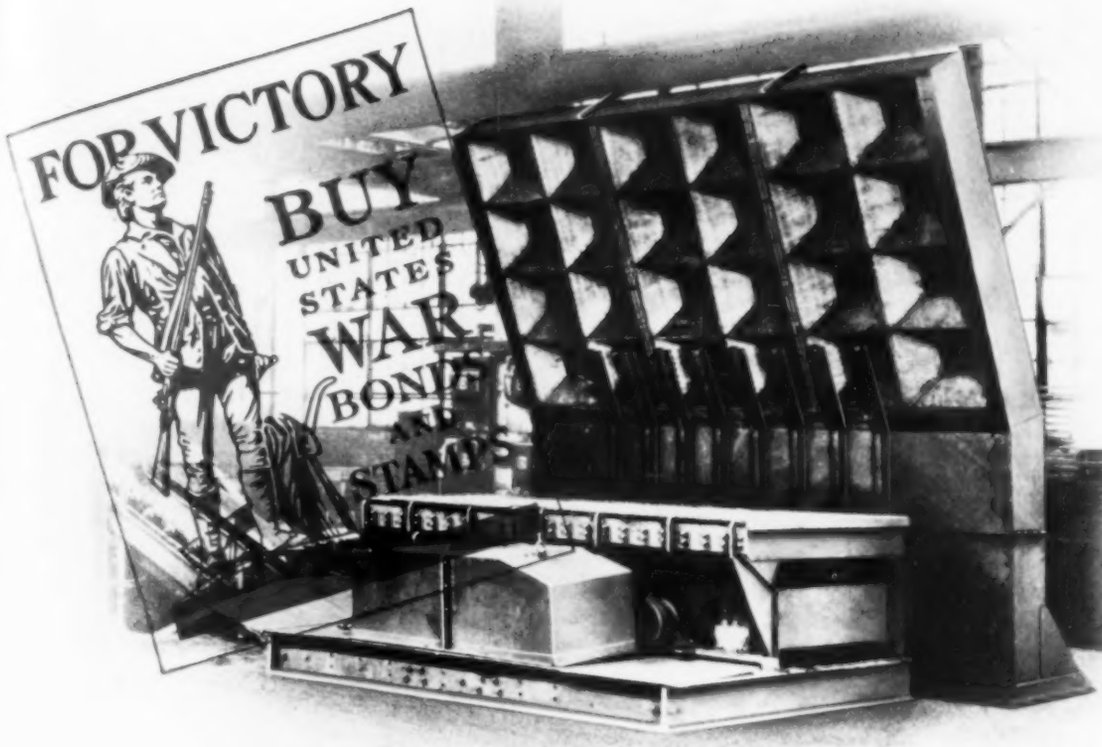
This "phantom foundryman" automatically controls the blast to supply a constant *weight* of air per minute, regardless of wind-box pressure, atmospheric temperature or barometric pressure. It makes *every* day a "good pouring day"!

You'll get consistently better melting . . . hotter heats without burning . . . uniform pouring conditions that prevent faulty castings and eliminate need for pigging.

Write for Bulletin B-268 on Foxboro Air Weight Controllers, or detailed information on other Foxboro Instruments for metal industries. The "Phantom Foundryman" is only one example of Foxboro's Creative Instrumentation that can boost output, cut costs and save maintenance in wartime plants. **The Foxboro Company, 32 Neponset Ave., Foxboro, Massachusetts, U. S. A.** Branch offices in principal cities of the United States and Canada.

RECORDING · CONTROLLING · INDICATING

FOXBORO
REG. U. S. PAT. OFF.
Instrumentation



This Dust Hood

is doing "a job that couldn't be done"

● The dust nuisance resulting from the shaking out of dry sand molds was so severe in this foundry, that the operator of the overhead crane, who was of necessity directly over the shakeout, had to use a gas mask. It was impossible to see even 10 feet in any direction when a flask was being shaken out.

After other attempts to relieve the dust nuisance had failed, the management installed a Bartlett-Snow Side Wall Dust Hood (Des. 12170A) 12′ long, 14′ high, having 24 pyramidal shaped openings which deliver upwards of 33,000 cubic feet of air per minute to the plenum chamber connected with an underground duct to a Bartlett-Snow Wet Type Dust Collector located outside the building.

So great is the dust collecting capacity of this equipment—see illustration above—that it is now possible to shake out flasks 7′ long, 3′ wide, and 3′ high on the most distant edges of the shakeout without any visible dust loss whatever,—and even to handle flasks 17′ long, 5′ wide and 3′ high, with only slight traces of dust loss, even though these flasks are 7′ longer than the shakeout itself.

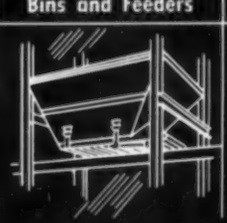
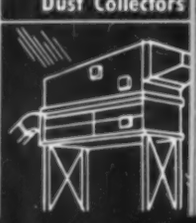
Our recently issued 40-page Foundry Bulletin No. 31 describes Bartlett-Snow Dust Collecting and other Foundry Equipment in detail and contains much information of interest to every foundry manager and operating man . . . Send for a copy today!

THE C. O. BARTLETT & SNOW COMPANY
6201 Harvard Avenue, Cleveland, Ohio
Engineering and Sales Representatives in the Principal Cities

BARTLETT-SNOW

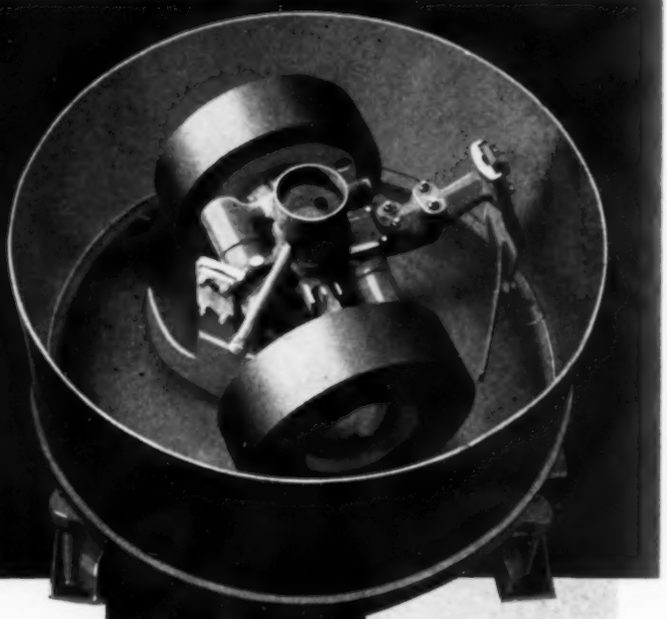
ENGINEERS AND FABRICATORS FOR THE FOUNDRY INDUSTRY

Complete Sand, Mold and Castings Handling Equipment for any requirement, including

Shakeouts	Elevators	Aerators	Sand Distributors	Bins and Feeders	Apron Conveyors	Dust Collectors
						

100% War Bond Buyers
Average Payroll Deduction 14%
U. S. Treasury

IMPROVED PRODUCT QUALITY . . . INCREASED PRODUCTION . . . GREATER ECONOMY—RESULT FROM SIMPSON INTENSIVE MIXERS AND NATIONAL AUXILIARY EQUIPMENT



TODAY, more than ever before, casting quality must achieve perfection . . . costly rejects must be eliminated. Good castings require uniform sand . . . properly prepared and strictly controlled.

Simpson Intensive Mixers, through the mulling principle of mixing, provide foundry sand of maximum workability with minimum binder and moisture—resulting in castings that are cleaner, smoother and free of sand defects. The Simpson Mixer is the standard machine for foundry sand preparation.

National Auxiliary Equipment used with Simpson Intensive Mixers provide greatest possible operating efficiency by saving time and improving control. Any combination of these accessories may be used with a Simpson Mixer, in an arrangement best suited to your requirements.

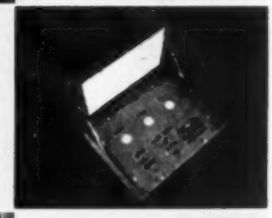
Call a National engineer for full information on how to improve casting quality and increase production with Simpson Intensive Mixers and National Auxiliary Equipment. You will also find the way to the lowest cost-per-ton of good castings produced.

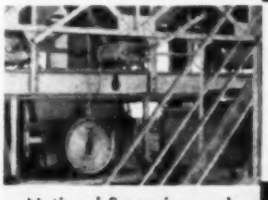
National Liquid Meter, for accurate measurement of oil and water for each batch of sand.

National Aerator to fluff and aerate mulled sand on discharge from a Simpson Intensive Mixer.

National Bucket Loader to prepare one batch of sand while another is mixing, speeding mixer charging.

National Time-Master, for complete automatic loading and discharge of a Simpson Intensive Mixer.





National Weigh-larry, for quick and positive proportioning of materials by weight.

National Screening and Magnetic Separator Unit, to clean sand by screening and for removing metallic refuse.

SIMPSON INTENSIVE MIXERS

NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO, ILLINOIS

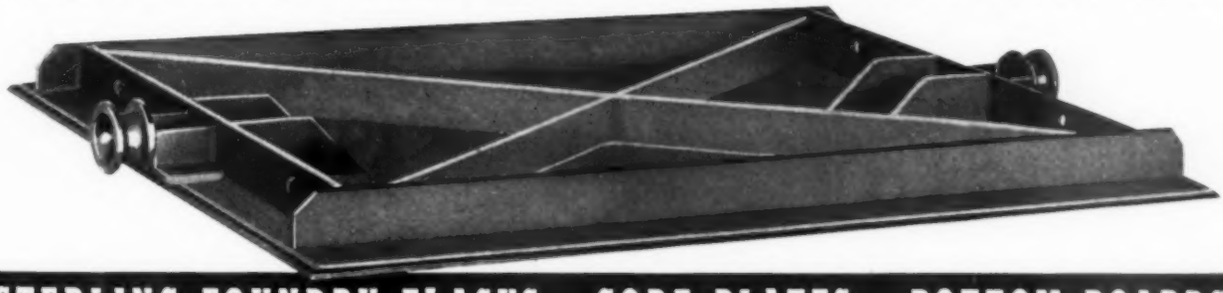
Manufacturers and Selling Agents for Continental European Countries:—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

Sterling All-Welded CORE PLATES

Available in Three Styles with Plain Tops or Perforated Tops. Large Sizes can be Equipped with Trunnions.

STEP up your foundry war production with Sterling All-Welded Steel Core Plates and Bottom Boards. Heavy reinforcing angles and bars assure maximum strength and rigidity. Will not deflect or warp. Core Plates are machined to .015" and Bottom Boards are level within 1/16". Like the well-known Sterling Foundry Flasks, these Core Plates and Bottom Boards are engineered to meet practical requirements . . . designed for speed and convenience in operation. If your work requires plates of special design, write us. With their experience in this field, our engineers will gladly give their recommendations.

STERLING WHEELBARROW CO., MILWAUKEE, WIS., U. S. A.

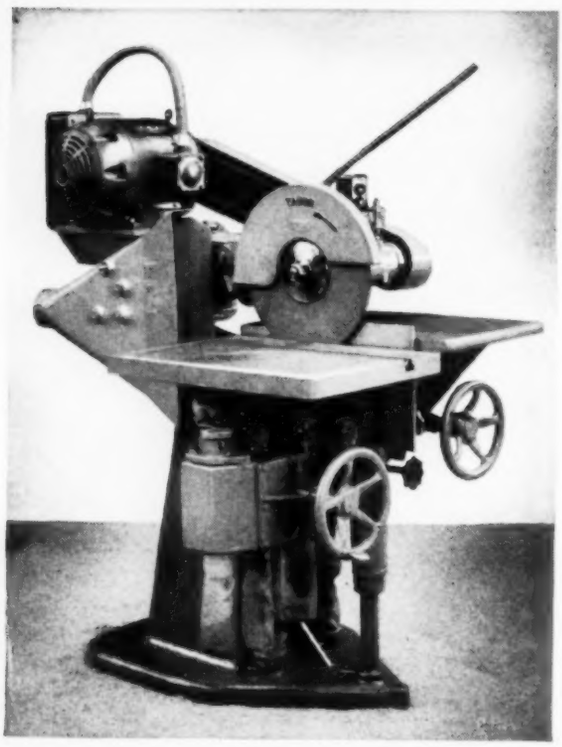


STERLING FOUNDRY FLASKS — CORE PLATES — BOTTOM BOARDS

A 3892-1P

Save PRICELESS TIME *with the . . .*

TABOR-BRASIVE CUT-OFF MACHINE



The above-all need of the day is high and ever higher production. Between pouring and shipping no time can be lost . . . and none need be.

A Tabor-Brasive Cut-Off Machine will more than keep pace with your increased production schedules. It will cut gates and risers from castings of manganese bronze, aluminum bronze, nickel, monel and other tough-cutting metals in a matter of seconds—unbelievably fast. Cuts are clean and close to the casting—snagging and finishing grinding are reduced to a minimum, often entirely eliminated.

Write for information, giving details of your cutting problems. There is a Tabor-Brasive Cut-Off Machine of a size and type to meet your requirements.

THE TABOR MANUFACTURING COMPANY
6225 Tacony Street • Philadelphia • Pennsylvania

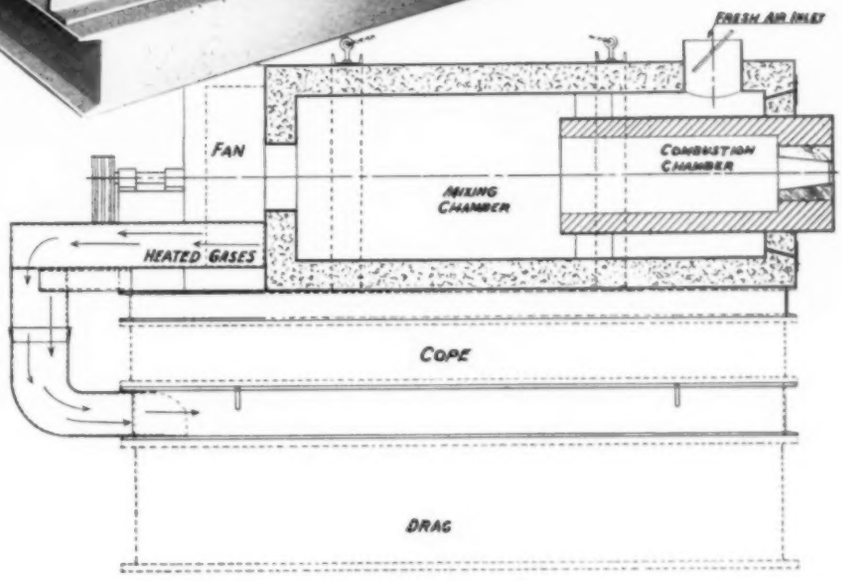
Representatives: *Los Angeles, Calif.,* Snyder Foundry and Supply Co.; *Oakland, Calif.,* Pacific Graphite Co.; *Seattle, Wash.,* Carl F. Miller & Co.

UNIFORM DRYING—*Faster!*

with MAHR *portable* MOLD DRYER

- **HEAVY STEEL CONSTRUCTION**
- **FAST HEAT-UP QUICK DRYING**
- **FOUR SIZES:**
  - 250,000 Btu Capacity
  - 500,000 Btu Capacity
  - 750,000 Btu Capacity
  - 1,250,000 Btu Capacity
- **OIL OR GAS FIRED**
- **PORTABLE**

MAHR
ENGINEERS • DESIGNERS • MANUFACTURERS
ALL EQUIPMENT FOR METAL HEATING



Large, cumbersome molds are difficult to handle in drying, yet proper and quick drying is one of the most important elements in producing a good casting After long and exhaustive study and tests of many drying methods in our own and other foundries, we are proud to announce this newest member of an old family.

Designed by an organization long experienced in industrial heat application, and thoroughly tested under everyday foundry conditions with outstanding performance results. Heat-up time is extremely fast. Large volumes of hot gases are forced into every part of the mold for fast, complete drying. Normal drying times are shortened.

The entire unit is mounted on a heavy channel steel frame, and can be quickly moved and set up for use on any large mold. Fuel may be either gas or oil. Economy in operation is one of its features because of rapid and complete combustion.

FOR OVER A QUARTER CENTURY, the name MAHR has been associated with industrial heat equipment of quality and the most modern design. These products include CORE AND MOLD OVENS, FURNACES OF ALL SIZES AND TYPES FOR ANNEALING, STRESS RELIEF, ETC., FORGES, TORCHES, BURNERS, BLOWERS AND VALVES.

WRITE, WIRE, OR PHONE FOR BULLETIN AND PRICES

Get our fully illustrated and descriptive bulletin telling all about this dryer. It can be used nearly every day in any foundry. With sub-contracts for many very large castings today, several foundries are already using batteries of these dryers with a great saving in time and costs. Write, wire or phone TODAY for complete information.

★ ★ ★ ★ ★ ★ ★ ★ ★
★ *Save ALL* ★
★ *your scrap!* ★
★ ★ ★ ★ ★ ★ ★ ★ ★

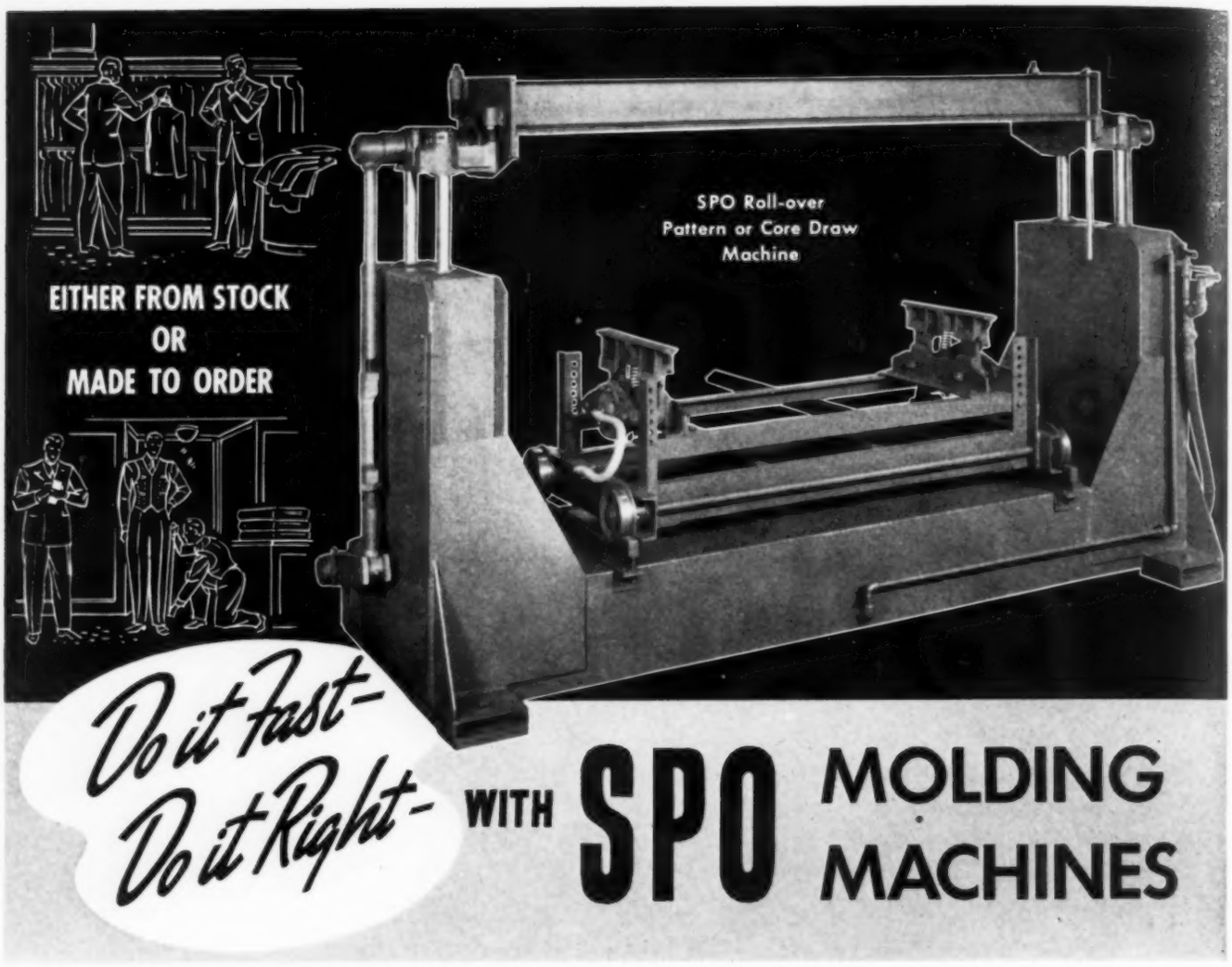
Sales Offices in Principal Cities

MAHR MANUFACTURING CO.

DIVISION OF DIAMOND IRON WORKS, INC.

1709 NORTH SECOND STREET • MINNEAPOLIS, MINNESOTA, U. S. A.

★ ★ ★ ★ ★ ★ ★ ★ ★
★ *Buy MORE* ★
★ *War Bonds!* ★
★ ★ ★ ★ ★ ★ ★ ★ ★



SPO BUILDS MOLDING MACHINES TO ORDER

The SPO line of molding machines covers a wide range of needs. One problem after another has been solved until today SPO equipment plus SPO engineering can adequately meet the majority of typical foundry conditions today.

However, sometimes a job is really "different". To do it well, a new method may have to be devised—a method which will produce finer castings at a lower ultimate cost. Continually, new ways must be found to increase both quantity and quality. More and more, *less* skilled labor must now be utilized in order to conserve *more* skilled labor in every field.

In some instances these ends can be accomplished by modifying a SPO machine now in the line or by adding a special feature. In others, as in the case illustrated above, an entirely new machine has to be developed. We have gotten quite a kick, during the past year, from being privileged to hit certain "different" situations *right on the nose.*

Why not call on the SPO staff to help "crack that tough one" which is coming up right now? Our long practical experience as foundrymen is at your command, especially for the designing of equipment which will *exactly* fill your requirements.

SPO

INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND, OHIO

Geared for Speed

in the production of

INDUSTRIAL RADIOGRAPHS

CLEARMIX
INDUSTRIAL
X-RAY DEVELOPER

PERFIX
INDUSTRIAL
X-RAY FIXER

We have learned through countless laboratory tests of our own and competitive products that one type of developer and fixer would not serve two types of x-ray film—namely, industrial and medical.

The emulsion employed in the manufacture of industrial x-ray films is different from that used for medical films.

Picker Clearmix *Industrial* Developer and Perfix *Industrial* Fixer are *specific* formulae . . . and will produce the finest results obtainable in terms of speed, clearness, contrast and detail.

When reordering concentrated x-ray solutions, insist upon Clearmix Developer and Perfix Fixer and you will see the difference in processing results!

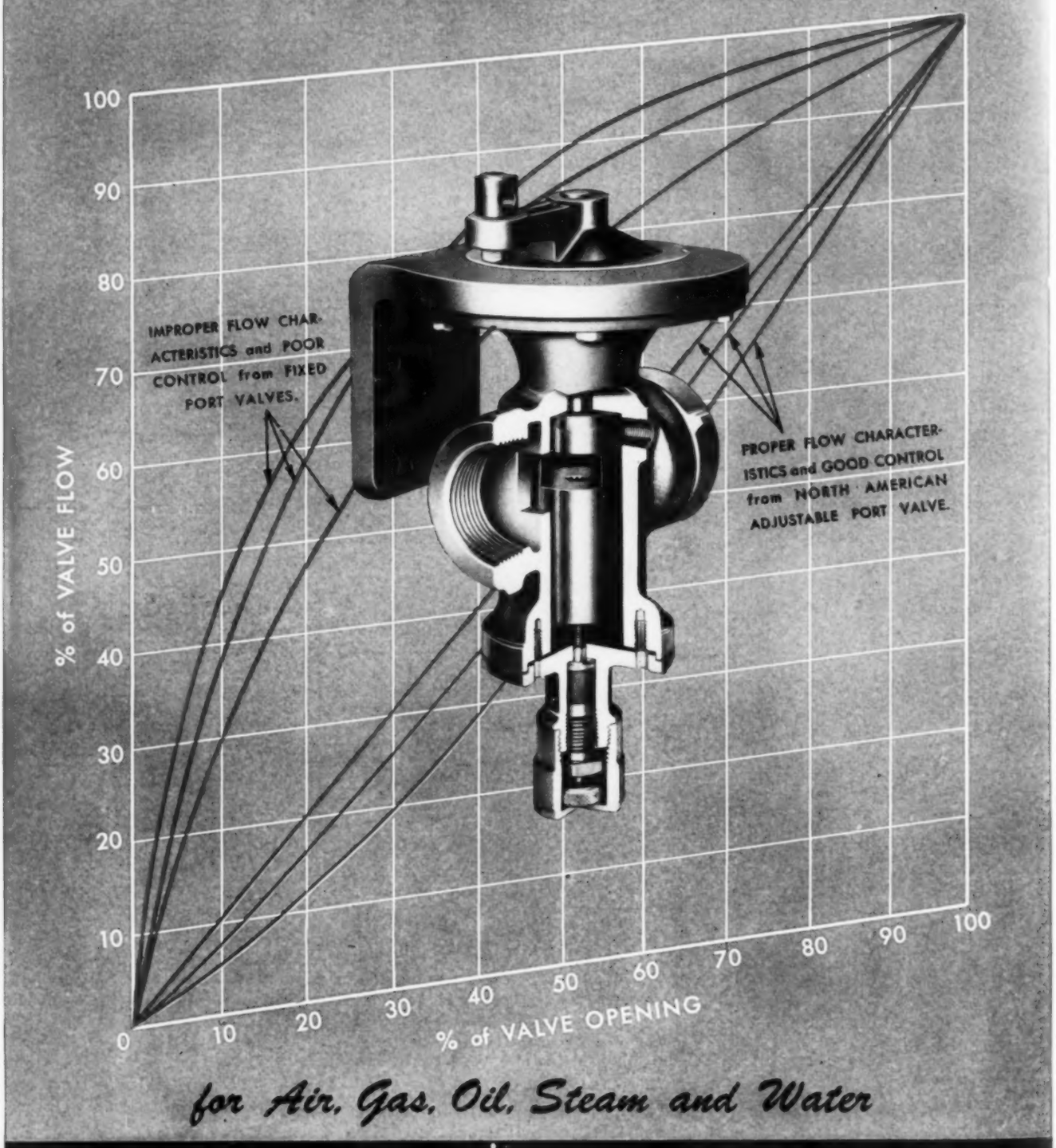
PICKER X-RAY PX CORPORATION

300 FOURTH AVENUE, N. Y. OFFICES IN PRINCIPAL CITIES

WAITE MANUFACTURING DIVISION • CLEVELAND, OHIO

NORTH AMERICAN

Adjustable Port Valves for Flow Control



for Air, Gas, Oil, Steam and Water

THE NORTH AMERICAN MANUFACTURING COMPANY

MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL

BRANCH OFFICES *with* FIELD ENGINEERS *in* PRINCIPAL CITIES

CLEVELAND, OHIO

How we can help you meet your *Ferro-Alloy Requirements*

"Electromet" Ferro-Alloys and Metals for the Cast Iron Foundry

Added to the Cupola	*Result*
"EM" Silicon Briquets (round)	Deoxidize and aid machinability by graphitizing effect. Reduce chill in light sections. Permit easy control of silicon additions.
"EM" Chromium Briquets (hexagonal)	Increase hardness, wear resistance, corrosion resistance, and heat resistance. Promote greater density. Permit easy control of chromium additions.
"EM" Silico-Manganese Briquets (square)	Act as a scavenger. Harden iron when added in large quantities. Permit easy control of manganese additions.
Added to the Ladle	*Result*
85% Ferrosilicon 50% Ferrosilicon	Deoxidizes and aids machinability by graphitizing effect. Reduces chill in light sections. (85% grade used for large additions.)
Silicon-Zirconium	Deoxidizes and graphitizes, improving density of iron.
Ferromanganese-Silicon	Combines graphitizing influence of silicon with scavenging action of manganese.
Ferromanganese	Acts as scavenger. Hardens iron when added in large quantities.
Foundry Grade S.M. Ferrochrome	Increases hardness, wear resistance, corrosion resistance, and heat resistance. Promotes greater density.
Ferrovanadium	Refines grain (of value particularly in improving impact strength of hard irons).
"SMZ" Alloy	Converts normally hard iron into high-strength gray iron. Reduces chill. Improves strength and physical properties.

"Electromet," "EM," and "SMZ" are registered trade-marks of Electro Metallurgical Company.

UNDER present conditions, perhaps you can't get all the ferro-alloys you want in the grades you are accustomed to using. If so, it may be necessary for you to modify your practice to use alloys that are available. You may be able to substitute available standard sizes and analyses for special grades. You may be able to use a different combination of deoxidizers to achieve the same result. Or perhaps you can change the composition of your iron to take advantage of alloys that are available, and still obtain equally good physical properties.

With the knowledge gained through 35 years' experience in the manufacture and use of ferro-alloys, we may be able to suggest what you can substitute and how you can change your practice to

get the results you want. Our metallurgists can give you practical, on-the-job help. Ask for this service to help meet your ferro-alloy requirements. No obligation is involved.

Electro Metallurgical Company
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York, N. Y.

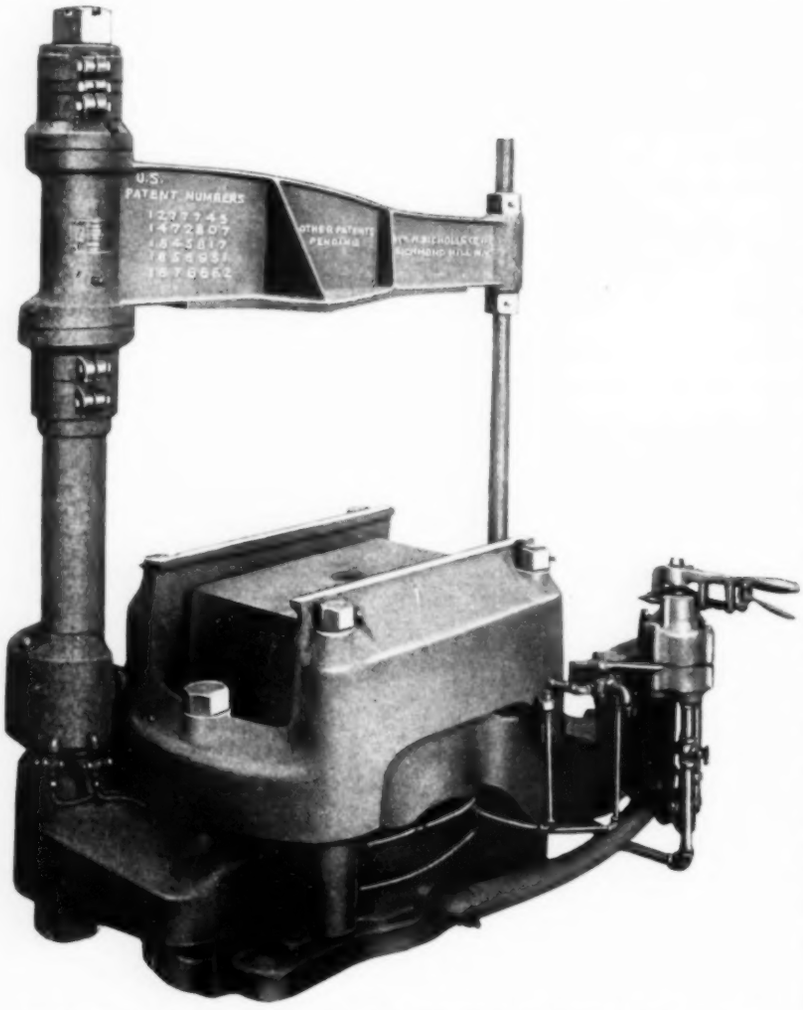
"Electromet" Ferro-Alloys and Metals are distributed through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Electromet
Trade Mark
Ferro-Alloys & Metals

MOLDING MACHINES

FOR PEAK PRODUCTION

FASTEST MOLDING . . . LOWEST MAINTENANCE



16-36 Type D Heavy Duty Jolt Squeeze Molding Machine with Pattern Drawing Device—Open End Frame— 7" diameter jolt piston—16" diameter squeeze piston.

Redesigned to a minimum of working parts, thereby greatly reducing maintenance cost and at the same time lowering operating costs through saving of labor.

TODAY—More than ever—foundrymen must rely upon their molding equipment to meet defense production schedules. They cannot afford to have a breakdown! These machines have played an important role in the success of many large foundries all over the world. This international acceptance is due to their ability to "stand up" under the heaviest production.

Our Type D Molding Machines are built in nine sizes.

We invite you to write for particulars on the NICHOLLS 1942 model production line of Molding Machines.

Wm. H. NICHOLLS Co., Inc.

RICHMOND HILL, LONG ISLAND, NEW YORK

Established 1910

Foreign Manufacturers and Selling Agents—
For Continental Europe and Great Britain—The George Fischer Steel and Iron Works, Schaffhausen, Switzerland

NICHOLLS

Entrust your core-room apprentice with

CORDIP

The extreme simplicity with which Cordip is mixed and applied makes it the ideal beginner's task for that new apprentice just put to work in your core-room. Whether they be dry or green sand cores to be dipped or sprayed—Cordip is the one compound that will serve your many corewashing requirements.

Made of pure, natural amorphous Mexican graphite, combined with certain other ingredients, Cordip requires but water to bring it up to the proper consistency for use. *No additional binder being necessary.* Cordip is made in various grades to fit the entire field of core manufacture—no matter whether the cores are large or small, or a hard or soft coating is desired.

High temperature pouring, as practiced today, requires a core wash that not only applies easily and quickly—but also *"turns"* the iron to produce smooth, clean castings, thereby reducing scrap and cutting cleaning costs to a minimum.

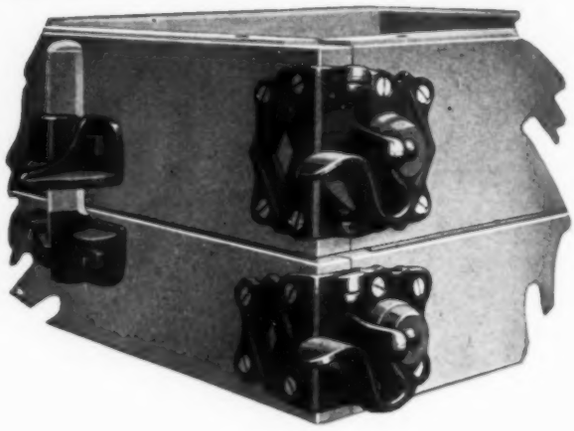
Today is the time to try Cordip!

MEXICAN GRAPHITE PRODUCTS

CORDIP
MEXITE BRIQUETTES
No. 8 MEXICAN GRAPHITE
MEXALOY
MEXICAN PLUMBAGO

THE UNITED STATES GRAPHITE CO.
SAGINAW, MICHIGAN, U.S.A.

A *Real* INVESTMENT FOR MORE PRODUCTION!

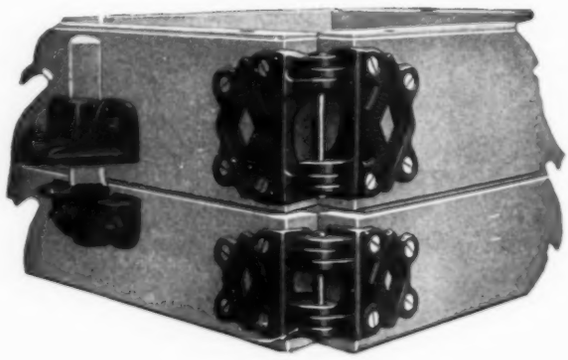


DIAMOND FLASKS

No matter what happens—you'll never be wrong if you equip for production with *good* flasks. Because we can give you many exclusive features in a flask developed over a period of 50 years, it can also be said that, "You can't go wrong on a Diamond," either. Note these important features:

- **A SUPERIOR LATCH (exclusive)**

  It's self-compensating for wear. The tighter you draw it, the firmer the grip. Has special cam which is easily adjustable as extreme wear on parts develops. Only *Diamond* has this patented feature.



- **PRECISION-MADE**

  Made from the finest grade of well-seasoned cherry stock, all flasks are made to precise measurements according to your specifications.

- **A PATENTED HINGE (exclusive)**

  Note the construction of Diamond hinges. The lugs are carefully milled and are interlocking which eliminates "play" no matter how long or how hard the flask is used.

- **SPECIAL SHAPES**

  We regularly supply customers with special shape flasks, including round flasks, and special cut partings.

STEEL JACKETS

Made from Nos. 7 to 10 gauge steel, true to size and taper. Are practically indestructible, and retain their shape under severest conditions. Thousands of these jackets in use.

DIAMOND

CLAMP AND FLASK COMPANY

Telephone 2553 **Richmond, Indiana**

Designers of CORE PLATES, JACKETS, BANDS, FLASKS since 1889

DEPENDABLE CORE BAKING . . . helps you produce better MAGNESIUM-ALUMINUM CASTINGS

THESE FEATURES OF DESPATCH OVENS SPEED EFFECTIVE CORE-BAKING

Here are some of the reasons why many of the largest magnesium and aluminum plants use Despatch ovens today:

1. BAKES UNIFORMLY throughout entire work-chamber using fast-flowing, recirculating convection heat from massive heaters. Heated air is driven through distributing ducts by high-volume fans. All cores bake evenly . . . no rejects.

2. SPEEDS OUTPUT. Despatch oven performance allows more cores to be baked per day than with old-type equipment. Rugged and dependable for continuous operation.

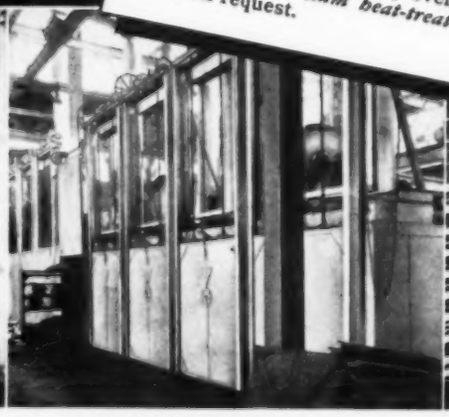
3. LOADS EASILY. Convenient handling systems to suit all plants. Types to fit any floor layout include vertical, continuous conveyors, shelf, rolling drawer, batch (car or rack), monorail and numerous others.

4. HEATS EFFICIENTLY. Direct-fired gas or oil heaters operate efficiently at any temperature setting—get the most from fuel used. Quick response to control equipment. No overshooting or heat lag.

PHONE OR WIRE TODAY FOR PROMPT SERVICE

A Despatch engineer will recommend a tested and approved standard core-oven to suit your plant's special needs. FREE Bulletin 31 listing foundry ovens or *Bulletin 81 describing Despatch magnesium heat-treating furnaces*—both available on request.

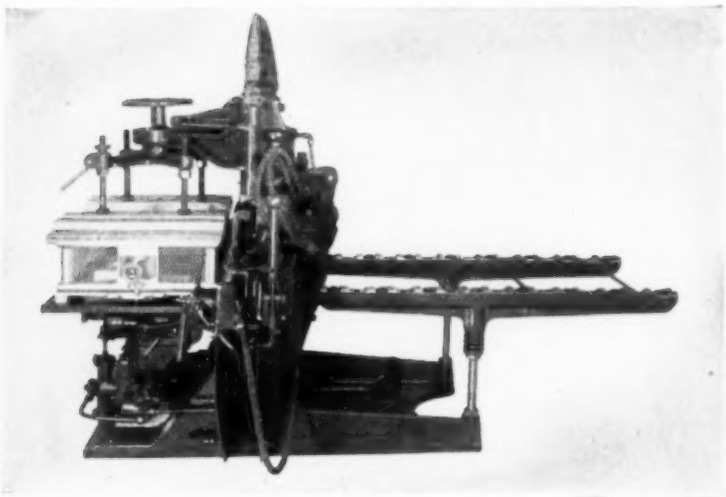
1. WIDE UTILITY drawer-type Despatch core oven. Each drawer is heat sealed, can be opened without lowering temperature in main oven chamber.



2. LARGE PRODUCTION is provided by this battery of Despatch rack-loaded ovens. Used in large magnesium foundry. Allows easy handling.

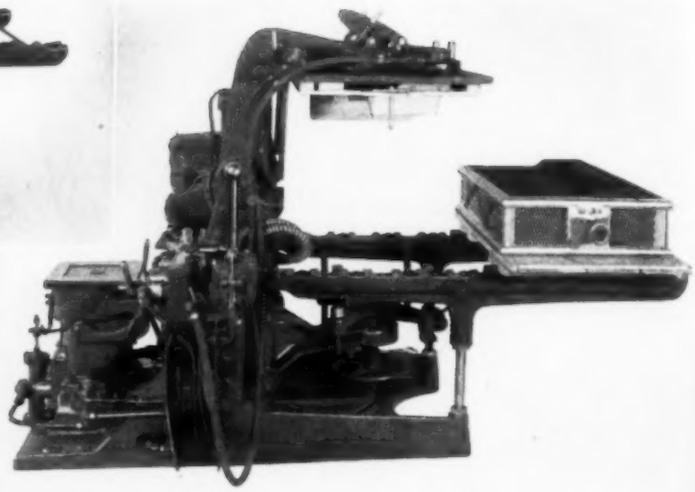
3. BAKING TIME REDUCED from over 5 hrs. to 2½ hrs. with this Despatch intermittent conveyor oven. Work chamber is 40 ft. long.

DESPATCH
OVEN COMPANY MINNEAPOLIS



Above—View of No. 815 Jolt, Roll-Over Pattern Draw Machine Clamped, Equalized, and ready for Roll-Over Operation.

At Right—View of same Machine after Rolling Over, Showing Perfect Pattern Draw.



A FAST HIGH PRODUCTION JOLT, ROLL-OVER PATTERN DRAW MACHINE FURNISHED IN THREE SIZES

• Johnston-Jennings Jolt Roll-Over Pattern Draw Machines meet every requirement for fast, easy, efficient work. They assure maximum production even with relatively unskilled operators,—and are standard equipment in most large aluminum and magnesium foundries. These machines are built in three sizes and require no pits. They are of open end construction and incorporate many design and operating refinements much appreciated by practical operating men. Our fully descriptive catalog giving complete details of this and other Johnston & Jennings molding machines furnished gladly on request — No obligation — Send for a copy today.

THE JOHNSTON & JENNINGS CO.

867 ADDISON ROAD • CLEVELAND, OHIO

A COMPLETE LINE PROVEN IN SERVICE INCLUDING—

PLAIN AIR JOLTS
in 12 different sizes

JOLT SQUEEZERS
fast sturdy machines—3 sizes

JOLT STRIPPING PLATES
4 sizes ranging up to 16" draw

JOLT, SQUEEZE, STRIPPING PLATE AND PATTERN DRAWS
Popular for medium service —2 sizes

PORTABLE JOLT ROLL-OVER AND PATTERN DRAW
A heavy duty thoroughly dependable machine—portable

JOLT ROLL-OVER AND PATTERN DRAWS
Fast large capacity machines with roll-out conveyors—4 sizes

Write for fully descriptive catalog giving complete specifications.

Son...

HE has just turned eighteen. Shaves twice a week and maybe a hair or two is sprouting on his chest. He shies away now when his dad tries to be affectionate and we noticed some lipstick on one of his handkerchiefs after a country club junior dance not so long ago. But it seems only yesterday, perhaps it was the day before, that he was a chubby legged kid swinging from the arch of the doorway, leading to the dining room, in a gadget that was something like a breeches buoy and he was sucking at the end of a turkey bone.

He went back to school this Fall, a tall, athletic lad, budding into manhood, but there was something else on his mind beside the football and hockey teams or the little blonde girl with whom he had "palled" around during the Summer. It seems as though he was listening for a certain call—the Clarion call that poets sing about—and, perhaps we just imagined it, but we thought we saw an upward jutting of his chin, a certain light in his eyes, and a sort of a rearing-to-go expression in his face.

It chilled us a bit in the region of our heart, when we thought of his discarding the sports coat for the "O.D." of the Army or the blue of the Navy. There was a bit of a catch in our throat as we thought of his putting aside his football helmet for one of steel; of his hanging up his hockey stick and reaching for a gun. After all we still regard him as just a little boy.

They tell us that the eighteen and nineteen year old lads are to be called to the service. When that day comes to us there will be prayers, but no tears. We shall not mourn nor shall we be fearful. Rather there will come welling up from our hearts that warm feeling of pride that millions of other parents will sense when their beloved lads marched away. Our lad is no different than the others. We are no different than other loving parents, nor is our sacrifice any greater. They are going to make great soldiers, sailors, marines and fliers out of these youngsters. And they will become a mighty force when they take their places beside their brothers in arms. They too know what they fight for. They too know full well of the sacrifices that must be made before the evil powers that threaten the world can be overcome.

And let us not forget that they are counting on us. They know that we shall not fail them.

God be with them and their brothers.

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.
REG. U. S. PAT. OFF.

CASE 1. MELTING MAGNESIUM*

PROBLEM A: Steel pots originally used. Cracks developed and molten magnesium worked through. Spillage on floor endangered life and limb. Escaping magnesium often complete loss because of rapid oxidation and combustion.

PROBLEM B: Magnesium picked up iron from pots.

SOLUTION: Tercod Crucibles installed. Molded from carbon bonded silicon carbide. Free from defects. Uniform, reliable structure. Durable. Iron-free.

CASE 2. MELTING ALUMINUM

PROBLEM A: Cast iron pots originally used. Pots frequently burned through. Metal losses great.

PROBLEM B: Aluminum picked up iron from pots.

SOLUTION: Tercod Crucibles installed. No accidental losses of this vital metal. No iron content to contaminate the molten aluminum. Faster melting because higher combustion temperatures were found practicable. More economical because of longer service.

DOWN TO CASES *with* TERCOD CRUCIBLES

✓ *Greater Safety*
✓ *Faster Melting*
✓ *Conserving Metal*

* Magnesium producers find Tercod Brick the only completely satisfactory lining for open flame reverberatories. Chief among the reasons for preference is that Tercod does not chemically react to molten magnesium or fluxes. *This means longer life!*

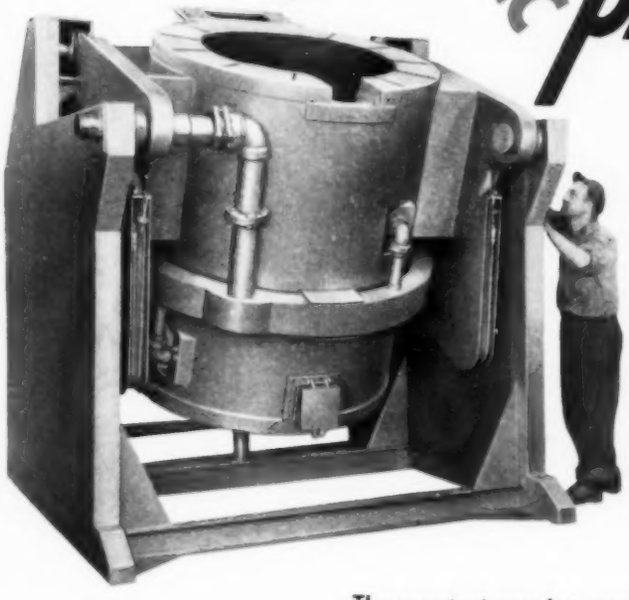
ELECTRO REFRACTORIES AND ALLOYS CORP.

GENERAL OFFICES: ANDREWS BUILDING, BUFFALO, N. Y.

Manufacturers of Crucibles, Alloys, Stoppers, Refractories, Grinding Wheels

Section of assembly floor in Fisher's new plant producing MNP Furnaces.

CONSTANT POURING ARC *plus.*



• • • Completely MOTORIZED OPERATION

Saves . . . arduous labor, melting and handling time, and material waste thru spillage in the melting of Brass, Bronze, Aluminum, Magnesium and other Non-Ferrous Metals.

The constant pouring arc feature of the Fisher Motorized Nose Pour Furnace eliminates material waste thru spillage and the need for ladle shifting during the pouring operation. This feature also greatly facilitates the use of conveyor or turntable systems to speed production. Tilting operation is completely motorized under positive-safety, finger-tip control.

These, and such other features as controlled furnace atmosphere which measurably prolongs pot life, low construction, low melting loss and multiple, low capacity burners operating from proportional mixing equipment combined to make the Fisher MNP Furnace an essential in every foundry producing large non-ferrous castings, or large quantities of small castings. Built in a complete range of capacities from 500 lbs. to 3000 lbs. in aluminum or equivalent capacities in other metals—to receive either crucibles or metal pots—gas or oil fired.

Write for your copy of "Fisher Products for the Foundry" describing Fisher's broad line of service-proved foundry equipment.

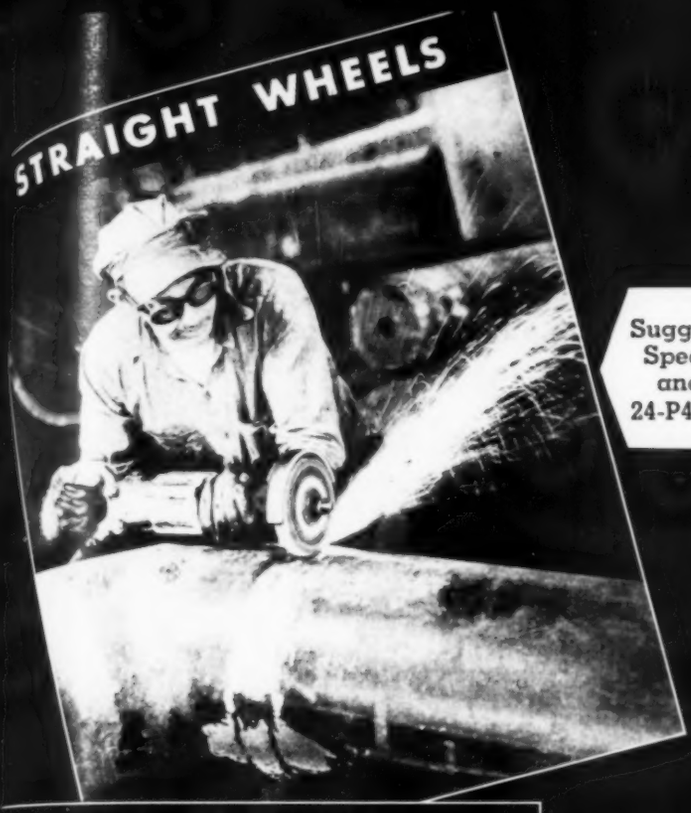
5519 N. WOLCOTT AVE., CHICAGO, ILLINOIS

Fisher FURNACE COMPANY

Major
PRODUCTION
Operations
DEMAND THE BEST
And "the best" in Chaplets, Chills and Superchills (patented) has long been identified with the fine old name of Fanner.
Today, more than ever, when there can be no compromise with either time or quality in turning out the best possible castings in the shortest possible time, the need for these vital Fanner products is a very essential "must" in every successful production speed-up.
Our engineering experience is "at your service" in helping you take full advantage of speeding up your casting program with Fanner Chills, Chaplets and patented Superchills. Call on us.
TO SPEED
WAR PRODUCTION
Use
FANNER
CHAPLETS AND
CHILLS

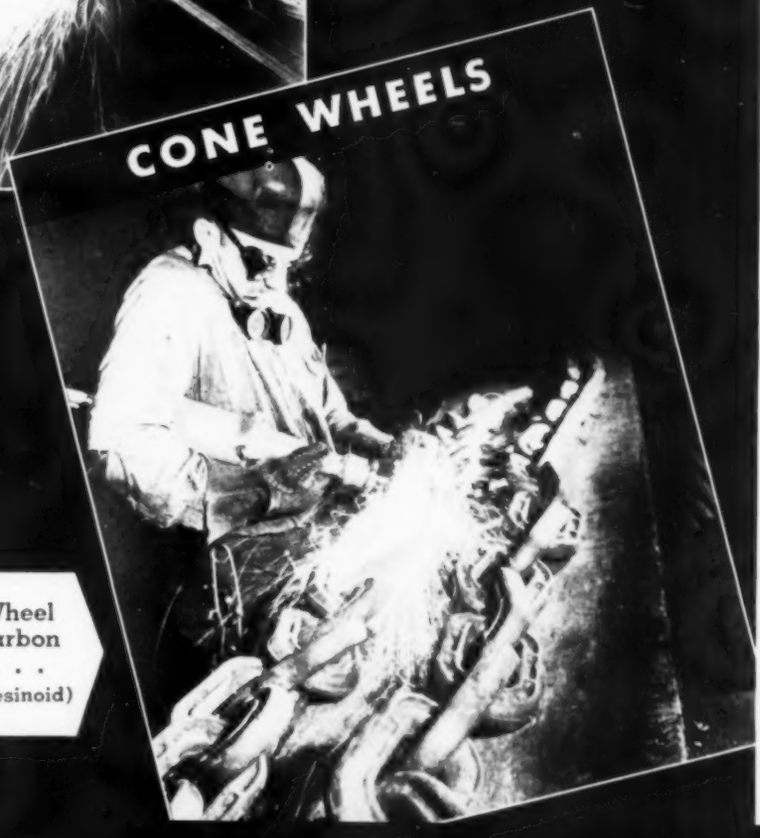
THE FANNER MANUFACTURING CO.

Brookside Park, Cleveland, Ohio . Canadian Fanner, Ltd. Hamilton, Ontario



Suggested Straight Wheel Specification for Carbon and Alloy Steels . . .
24-P4T-H (Alundum-Resinoid)

Suggested Cup Wheel Specification for Carbon and Alloy Steels . . .
16-P4T-H (Alundum-Resinoid)



Suggested Cone Wheel Specification for Carbon and Alloy Steels . . .
24-R4T-H (Alundum-Resinoid)

RESEARCH DEVELOPED

To Meet War Time Grinding Jobs

PRODUCTION and more production—that's the cry today in every war industry. In the cleaning room it means a wheel that's fast cutting but also a wheel that's long lived so time is not wasted in too frequent changes. And wheels on portable grinders are not treated gently, especially with today's inexperienced help. The grains must be tough and rugged—the bond must be strong yet somewhat resilient. The Norton research laboratories developed just such a wheel.

Alundum Abrasive

The cutting particles are hard, sharp Alundum abrasive from the Norton electric furnace plant. Special laboratory control at the furnaces and special crushing and screening processes result in tough, rugged grains that will stand the gaff.

Resinoid Bond

Special resinoid bond formulae developed by Norton research assure a strong, open structure wheel that allows the hard, tough grains to cut fast and last long.

Under the heat of grinding the bond softens just enough to act as a lubricant—loading is decreased and the wheels have a smooth grinding action. The resiliency of the bond is such that the wheels hug the work and do not tend to bounce around.

Wheel Balance

Perfection of balance—so important to operators of hand grinders—is built into Norton Resinoid Wheels by rigid control in manufacture. Wheels run free from vibration and reduce "end-of-the-day" fatigue.

Engineering Service

These are times when you need the services of Norton field engineers and Norton distributor representatives. They can help you get maximum production by specifying exactly the right grain, grade and structure of wheel for each grinding job.

NORTON COMPANY
Worcester, Mass.

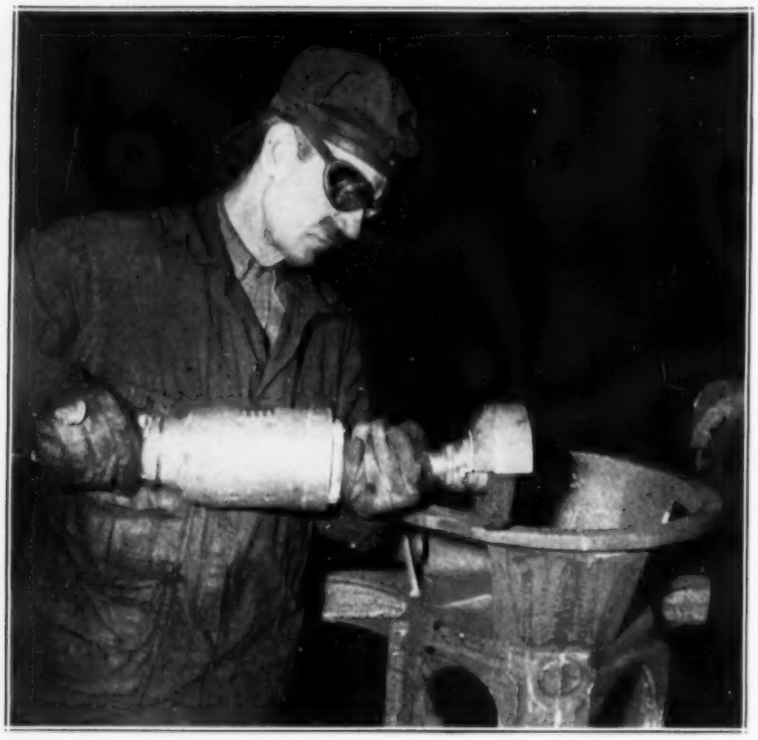
Distributors in All Principal Cities

NORTON ABRASIVES

W-893A

★ ★ ★ ★ CHICAGO PNEUMATIC NEWS ★ ★ ★ ★

60-CYCLE GRINDER MAINTAINS SPEED UNDER LOAD



↑ **POWER AND LIGHT WEIGHT** distinguish the 60-cycle squirrel cage induction type motor of CP-460 Grinders and Sanders and insure high sustained speed under all degrees of grinding loads encountered in general purpose grinding and sanding.

NEW CP TOOL COMPARES WITH HICYCLE GRINDERS IN EFFICIENCY AND ECONOMY

Low Maintenance — No Armatures, Commutators, Brushes

NEW YORK (CP)—Ideal for plants whose operations do not warrant the installation of high frequency tools—or plants that do have such tools but lack the high frequency power lines at points where additional tools could be advantageously used, the new CP-460 Grinders and Sanders afford fast, uniform grinding and sanding. These tools have a powerful, efficient, light-weight induction motor of the same type as the well-known CP Hicycle Grinders but operate on 60-cycle, 3-phase, 220-volt A.C. circuits. This motor insures high sustained speed under load.

The absence of commutators, brushes, brush holders, armatures, etc. and use of a special sturdily constructed rotor with low slip characteristic, provide heavy-duty production tools that are considerably lower in maintenance cost than the universal type of grinders and sanders. Write for complete details.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 E. 44th St., New York, N. Y.

↑ **COOL-RUNNING MOTOR** at all load speeds is assured by the coordinated ventilating system incorporated in CP-460 Grinders. Large intake and exhaust holes and efficient fan insure ample airflow for effective cooling.

NO ABRASIVE DUST can injure coil insulation of the new CP-460 Grinders and Sanders, due to ↓ rubber-covered stator winding and positive seal of vital parts.

↑ **STRONG, SILENT HELICAL GEARS** throughout (spiral bevel gearing on the right angle tools), with ball bearings of felt seal type, mounted on steel inserts cast integral, assure long-time service from CP-460 Grinders and Sanders.

CHICAGO PNEUMATIC

ELECTRIC TOOLS

ALSO: Air Compressors, Pneumatic Tools, Hydraulic Aviation Accessories, Diesel Engines, Rock Drills

HICYCLE and UNIVERSAL
Drills
Reamers
Nut Runners
Screw Drivers
Grinders
Sanders
Tappers

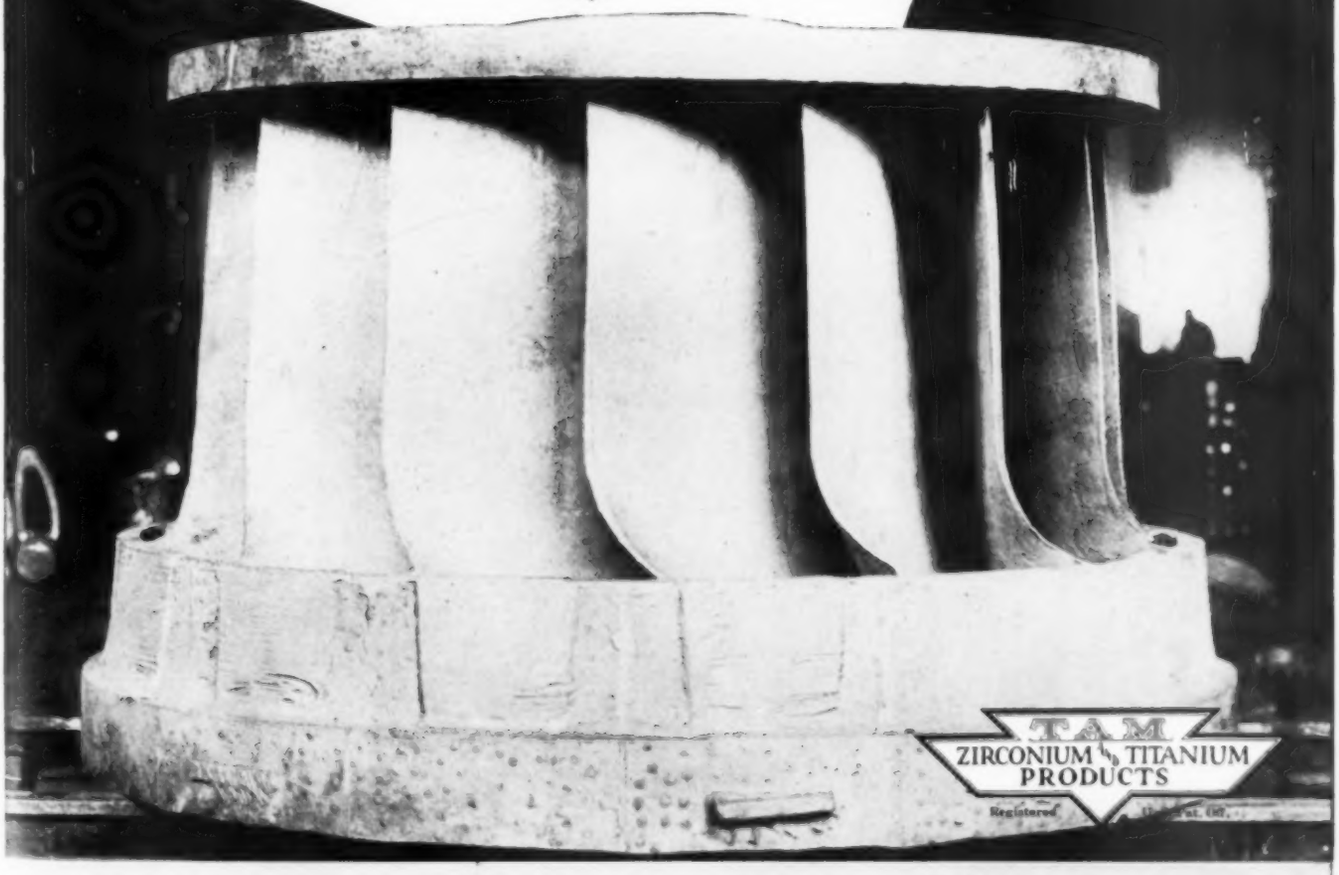
SMOOTH FACES FOR CASTINGS

TAM Zirconite super-refractory mold and core washes produce smoother surfaces and reduce cleaning costs

By resisting the burning-in of the molten metal, TAM Zirconite Mold and Core washes speed up output of good castings by reducing the number and time of cleaning and finishing operations. Available in three grades: Zirconite A has a melting point above 3775° F.; Zirconite B has a melting point above 3600° F.; and Zirconite C, for special uses, has a melting point above 3600° F. They are quickly mixed by adding to water, and can be applied by either spraying, swabbing or painting on cores and molds. Write for complete details, today.

TITANIUM ALLOY MANUFACTURING COMPANY

Zirconite Wash was used on this 94,000 pound .30-.35 carbon steel casting—11'6" high 14' diameter. Of special interest is the fact that no nails were used in the facing.



GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.
EXECUTIVE OFFICES: 111 BROADWAY, NEW YORK CITY

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WHEELA

Peacetime Engineering

WHEN the drums of war began to roll American was ready with the engineering experience and plant facilities to meet the urgent need for new types of speed-cleaning equipment.

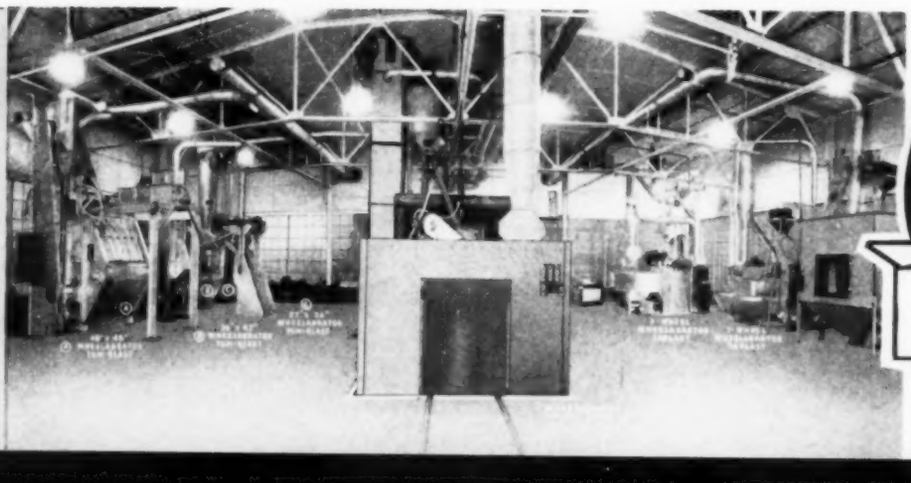
Special high-production machines for cleaning guns, shells, bombs, armor plate, aircraft engines, tank parts, etc., had to be designed quickly. Our engineers handled the job in record time because they were able to draw upon a wealth of experience in designing equipment for hundreds of complex cleaning jobs.

Fortunately, too, the healthy peacetime demand for WHEELABRATOR was such that our plant and manufacturing facilities had been greatly expanded. Again we were ready for the call to arms and the ever increasing demand for WHEELABRATORS—the equipment that is making speed-cleaning records in war plants throughout the nation.

American's March of Progress

Leadership in Research and Engineering Design has enabled American to originate these outstanding metal cleaning developments:

- Airless Abrasive Blasting. (the Wheelabrator).
- Tumblasts—with the exclusive apron conveyor for tumbling.
- Tablasts—plain and multi-rotary table types.
- Special Cabinets for automatic and continuous cleaning.
- The Wheelabrator Room with mobile blast unit.
- "Humane" blast cabinets and rooms.



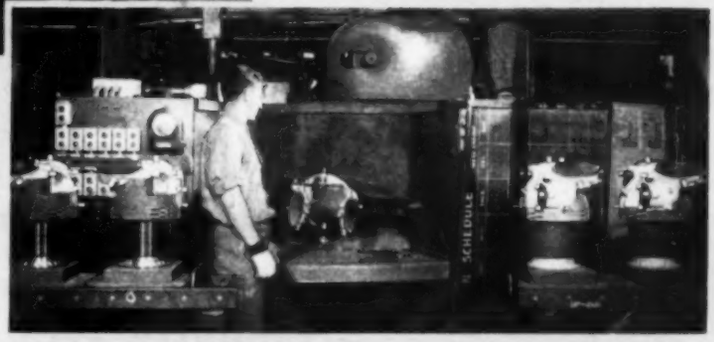
View of the testing room in our research department. Equipment includes standard and Special WHEELABRATORS for analyzing Cleaning problems of all kinds.

ABRATOR

Paves Way For Wartime Speed-Cleaning Records

INDUSTRY is fighting an uphill battle against time. To reach production goals it is necessary to make minutes do double and triple duty—actually it means "working miracles with minutes". And that is literally what airless WHEELABRATOR abrasive blasting is doing in hundreds of cases involving critical war production jobs.

At Left: American Shell Cleaning Machine cleaning 155 mm. shells after nosing at the plant of a prominent midwestern manufacturer. Ventilation is provided by an American "Dustube" cloth bag type dust collector shown in the background.



At Right: Close-up view of a WHEELABRATOR Special Cabinet cleaning airplane engine cylinder heads prior to metallizing.

Do You Know That

11,172,271 pounds of gray iron castings have been cleaned by Stedman's Foundry & Machine Works, Aurora, Ind., since April 1940 with a 36 x 42" WHEELABRATOR Tumblast. Average cleaning time is only two minutes for thousand pound loads.

●

A prominent aircraft engine manufacturing plant is using Wheelabrator Tablast with four 48" diameter tables to clean aluminum engine heads which are made of pure virgin aluminum ingot cast in baked sand molds. Nine heads are placed on each table and in three passes under the WHEELABRATOR blast all surfaces, including the deep fins, are thoroughly cleaned.

●

Customers report that cutting tools last longer and require less frequent grinding when they machine Wheelabrated castings which are made by Bronze Alloy Co., St. Louis, Mo., because they cut metal only —not scale and sand.

●

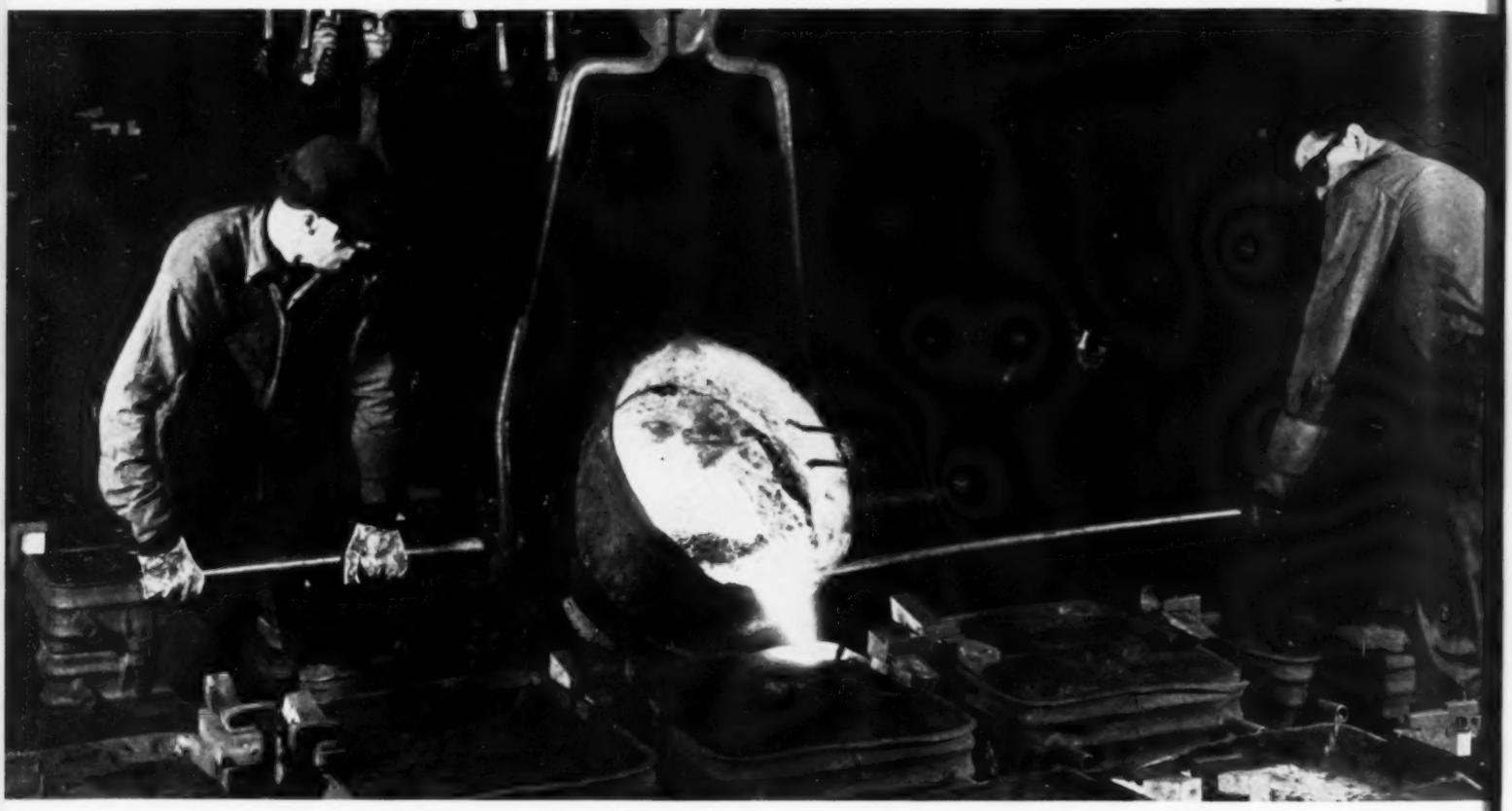
The 36" x 42" WHEELABRATOR Tumblast at the Bierman-Everett Foundry, Irvington, N. J., cleans loads of brass castings in 4 minutes and gray iron castings in 6 minutes. Cleaning time is only 1/3 of that required with their former tumbling barrel and airblast barrel.

AMERICAN FOUNDRY EQUIPMENT CO.

Blast Cleaning and Dust Control Engineers

505 SOUTH BYRKIT STREET • • MISHAWAKA, INDIANA

YES, CAPACITY IS IMPORTANT
-but how about EFFICIENCY?



Capacity . . . more capacity . . . everyone talks in terms of greater capacity. Yes, capacity is important—but how about efficiency? It's important, too, in determining output.

And when it comes to efficiency in foundry operation, the Republic Pig Iron Metallurgist is "always at your elbow" ready to show you short-cuts—able to help find production-slowing "bugs" and to eliminate them.

He knows irons—what they can and cannot do. He knows foundry methods and practices—how to arrange plant layout and schedules to obtain every possible pound of output from the available equipment.

Ask us to send him to your plant. See for yourself how his knowledge and experience can help step up your contribution to the war effort.

REPUBLIC STEEL CORPORATION
General Offices: Cleveland, Ohio
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Niles Steel Products Division • Steel and Tubes Division
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ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS

"CHATEAUGAY"
Low-Phosphorus, Copper-Free
"REPUBLIC"
(Northern)
Foundry, Basic and Malleable
"PIONEER"
(Southern)
Foundry and Basic

Foundries Establish Enviable Record During First Year of War

IN THE year since Pearl Harbor, industry has done an amazing job of increasing production to meet demands of the United Nations for the materials of war. Although this country had been in the process of tooling up and converting to war production for approximately a year and a half prior to the Jap attack on Dec. 7, the real record of achievement has been made during the past 12 months when production has been accelerated continuously. Statistics of the war agencies show that the monthly production of war materiel and the other things needed for the prosecution of war is in the neighborhood of four times the output during November 1941.

Because industry has been able to turn old machines to the manufacture of strange products; bring entirely new facilities into production with incredible speed; expedite delivery of materials which seemed impossible of procurement; train men and women to take the places of those called to the fighting fronts; and do a thousand and one things vital to production success, the United States has been able to contribute mightily to "the end of the beginning" as it has been so aptly expressed by Winston Churchill.

In looking back over the past year, all branches of the foundry industry can take great pride in having made major contributions to the war effort. When war was declared, steel foundries already were loaded with high priority work, and numerous new steel castings projects were well under way. During the past 12 months, these and other projects have been completed, plants have been expanded, and a number of iron and malleable foundries have been converted to the production of steel castings through installation of electric furnaces or converters and the necessary heat treating equipment. A conservative estimate would show the capacity for producing steel castings at least has been doubled during the period of the national emergency.

Outbreak of war had a temporary slackening effect on the gray iron branch of the industry. Prior to December 1941 most shops producing gray iron castings had been operating at full capacity, but, with the exception of castings for machine tools and other types of machinery, most of the output was for civilian requirements. Shortages of pig iron and scrap soon resulted in limitation orders which stopped all civilian production and left many manufacturers of gray iron castings facing serious curtailments in operations. The industry should be particularly gratified with the way in which the managements of individual foundries have solved the problems resulting from these curtailments. Through the conversion of facilities and personnel to the production of those classes of gray iron in which the war demands exceeded the available producing capacity; through developing new uses of gray cast iron in the war program; and through conversion to the production of steel or light metal castings, these foundrymen have continued to render exceptional service to the war effort. The gray iron branch also has supported its trade organization far more than ever before, and therefore appears to be building a solid foundation for the post war period.

Malleable foundries were hit almost as hard as gray iron shops through orders that almost eliminated production of agricultural implements and railroad castings of malleable iron. But that industry has done an exceptional job of helping the government in the problem of substitution, and as a result war demand for malleable castings is growing. Undoubtedly the work which has been done in the matter of substitution will prove of considerable value after the war.

While shortages of metals have been a difficult problem for most brass and bronze foundries, the vast majority of such shops have been exceptionally successful in converting facilities to war work. In the field of aluminum and magnesium castings, the record has been one of expanding production facilities, and that trend now has been accelerated. Both brass and iron shops are preparing to make aluminum and magnesium castings and a sizeable number of entirely new projects have been completed or now are under way. Technical progress in meeting production problems in this field has been a contributing factor to the success of the aircraft and tank programs.

The anniversary of Pearl Harbor finds the foundry industry set to produce all types of castings in quantities much greater than ever before considered probable. But the problems do not end here and the coming year will tax the ingenuity and resourcefulness of American foundrymen. Shortages of materials will continue for some little time. Men and women must be trained to take the places of those called by selective service. Plant and equipment must be kept in repair under severe working conditions. And of course, demands for castings may change as the war progresses from one phase to another. But an industry which has been able to establish such a fine record should render even greater service in the days to come.

Frank G. Steinebach
Editor

Buick Speeds Production of Aluminum Alloy AIRCRAFT CYLINDER H

By ARTHUR H. ALLEN
Detroit Editor, The Foundry

JUDICIOUS admixture of the "know-how" of automotive foundry technicians to prevailing practice in the sand casting of aluminum alloy cylinder heads for radial aircraft engines has been productive of some revolutionary advancement in the art, as exemplified in the new $10,000,000 aluminum foundry at Flint, Mich., built by the Defense Plant Corp. and operated by the Buick Motor Division of General Motors Corp.

Given the go-ahead around the end of December, the foundry management worked feverishly on layouts of the new plant, completing estimates by Jan. 23, permitting construction to start Feb. 27. Less than five months later, the first metal was being poured, and by the end of August production was up to 25 per cent of ultimate capacity and increasing steadily.

As construction of the new foundry building progressed, a temporary casting setup was established in one section of the adjoining Buick gray iron foundry for the purpose of training molders, coremakers, patternmakers and other workmen in the technique of handling aluminum. Schedules in the temporary aluminum foundry called for production of 75 heads a day by July, but so proficient had the force become by that time that production for the month was nearly twice what was originally planned—and this before operations were transferred to the new plant.

In laying out the new foundry, Buick literally started from scratch. They were experts in iron foundry operations, adept at working out the continuous flow of materials through a foundry and at devising means and controls to keep scrap losses within the usual 1 or 2 per cent demanded, but they knew little of casting aluminum, let alone airplane engine cylinder heads. So they started by making visits to foundries throughout the country doing this sort of work, those of the Aluminum Co. of America and the Wright Aeronautical Corp. Given utmost co-operation by these companies, engineers studied methods and equipment in detail, held long consultations with equipment manufacturers and finally arrived at what they wanted. Briefly, there were four things they sought, in addition to large and high-quality production. They were flexibility of equipment layout, elimination of needless trucking back and forth across the plant, more or less straight-line flow of castings through the plant with no back-tracking, and reduction of the usual scrap loss encountered in aluminum casting, which at times runs as high as 30 per cent.

How well these ends have been met can be appreciated from consideration of the general layout of the plant and the flow of material therein. The foundry, broadly speaking, comprises four identical units of molding machines, coreblowing machines, two baking ovens, one drying oven,

Fig. 1—Core box for one-half of cylinder head mold, showing precision tooled brass pattern. Fig. 2—Setting support wires in finned section of mold; a meticulous hand operation requiring accurate spotting of 500 to 600 separate wires

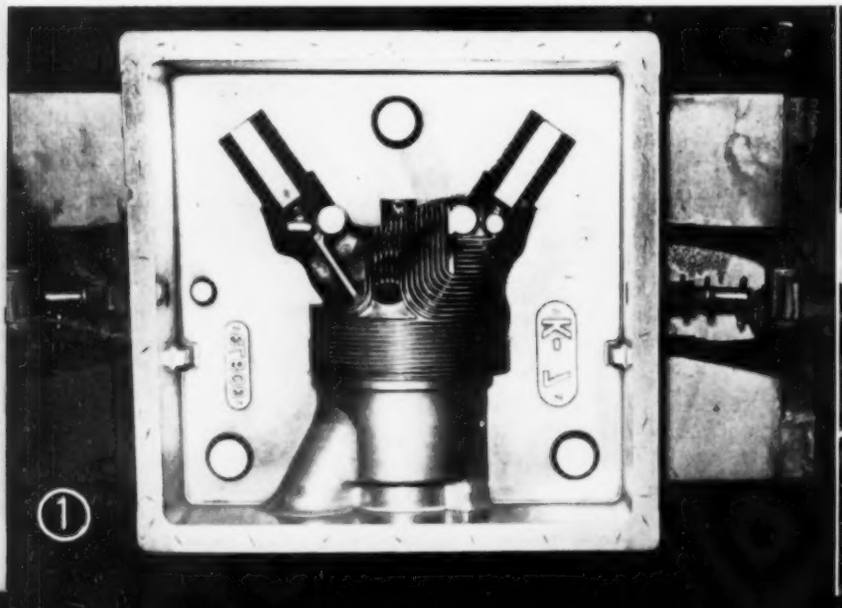
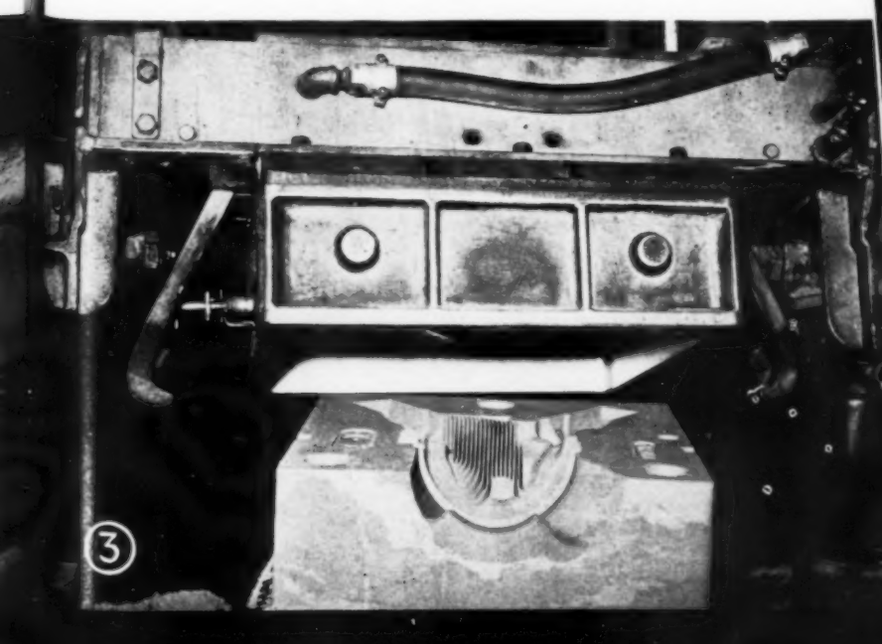


Fig. 3—Close-up of specially built molding machine with core just drawn from box. Rugged machine construction and slow draw are two features. Fig. 4—Pouring cylinder head molds on gravity roller conveyor boards; molds being ganged five to a board. Fig. 5—Discharge end of drying oven showing racks of molds and cores moved on overhead conveyor



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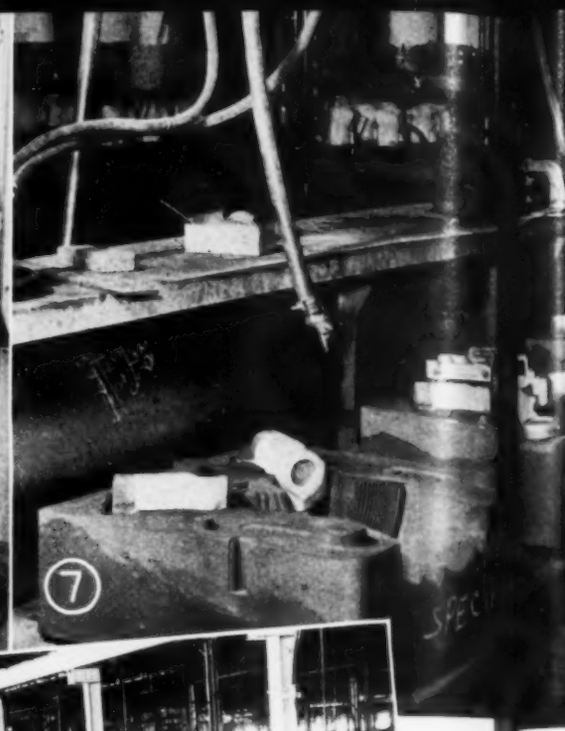
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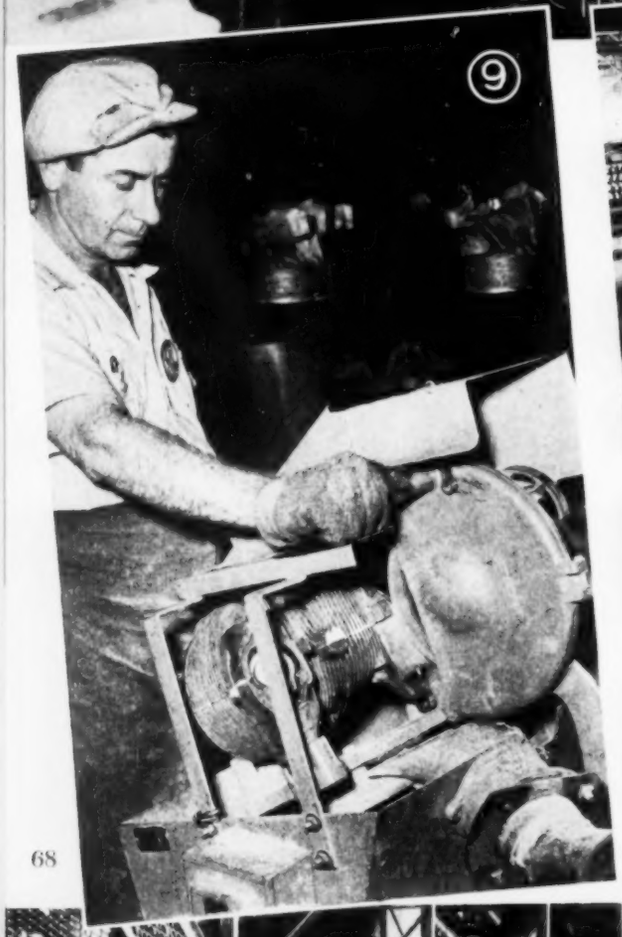
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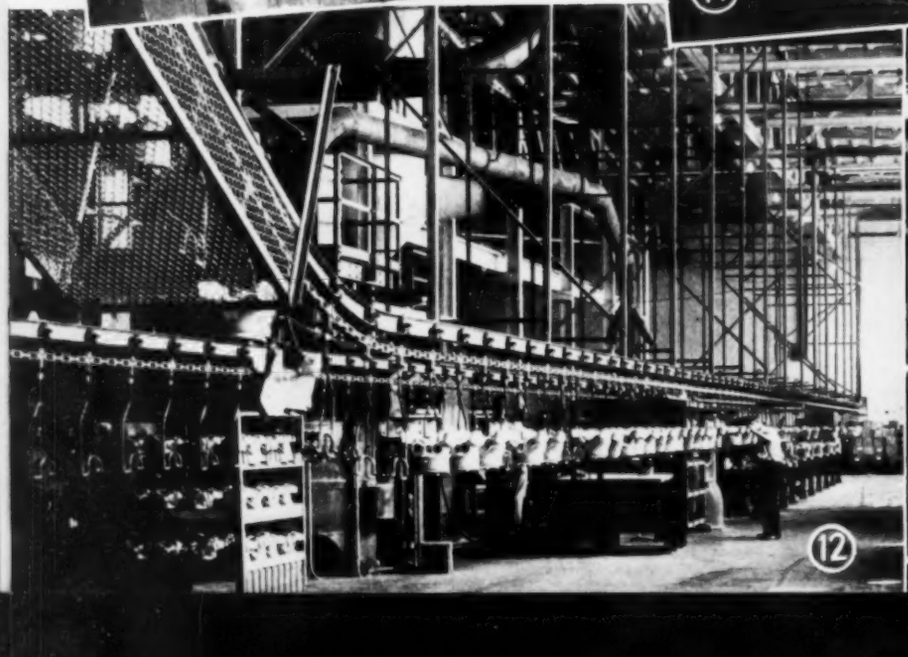
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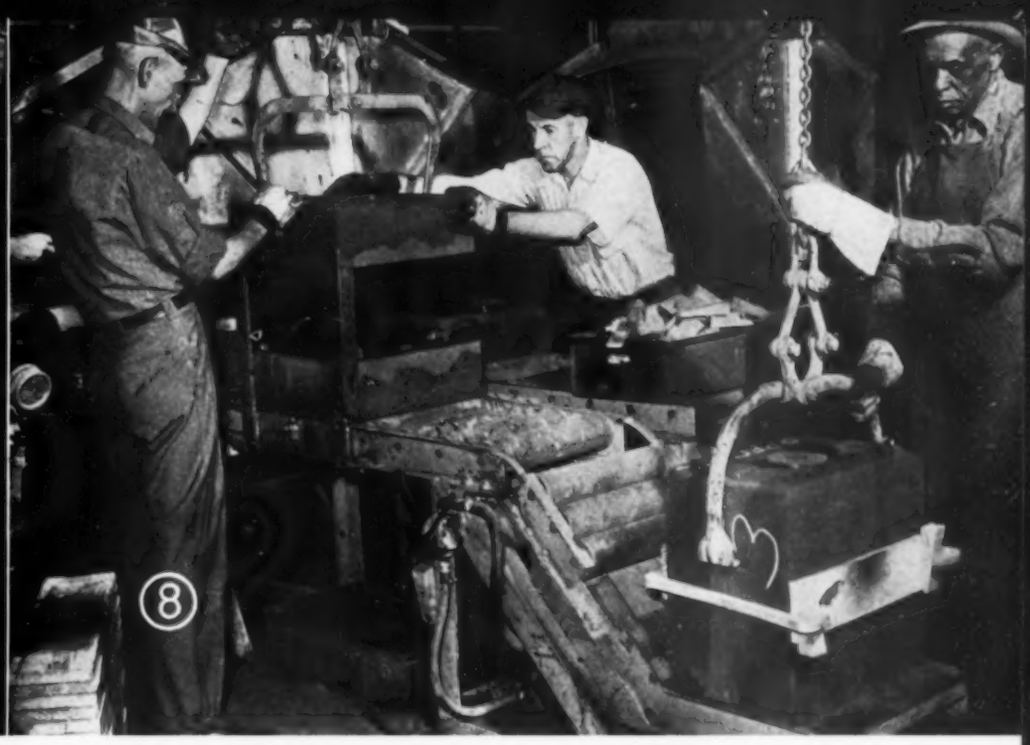


Fig. 6—Close-up showing sooting or smoking of drag with acetylene flame; fumes being removed by exhaust hood in background. Fig. 7—Core assembly line showing gages for accurate positioning of combustion chamber and rocker box cores in drag. Fig. 8—Assembly of cope and drag section of dry sand mold with assembled unit rocked down and set off conveyor at right, ready for transfer to pouring conveyor. Fig. 9—Specially built grinding machine and fixture for removing parting fins on rough castings. Fig. 10—Partial installation of electric heat treating furnaces with rack of castings being moved into position by crane. Temperature controls for all furnaces are located at a centralized station some distance away

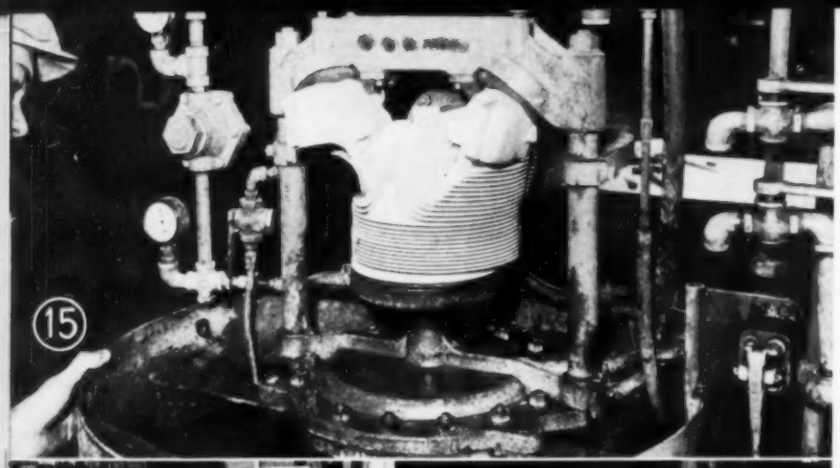
aluminum melting pots of 1000-pound capacity each, plus the necessary conveyor systems to handle molds and cores in process and through pouring and shakeout stations.

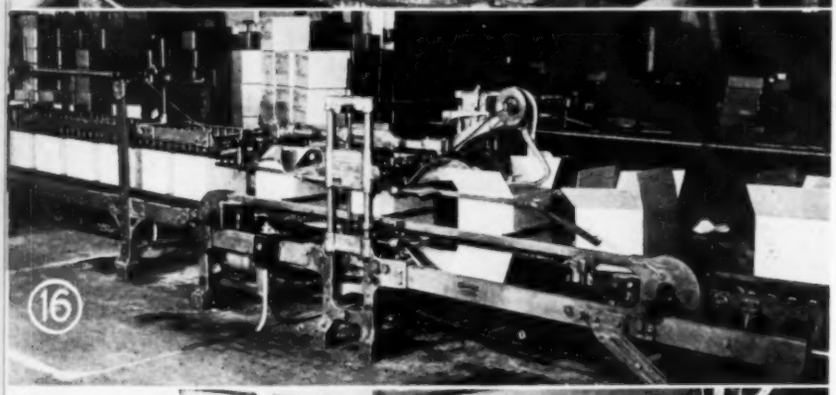
These four integral units are arranged adjacently and the flow of material is across the plant through each unit, with sand storage, mixing and handling on one side and the inspection and shipping conveyor on the opposite side.

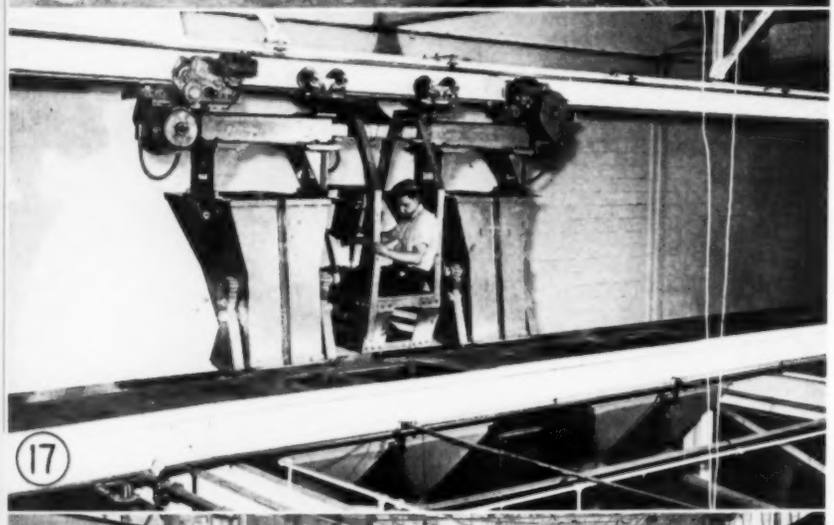
It may be well to examine in detail one of these complete "units." First it should be pointed out that the aluminum cylinder heads are cast in dry sand molds which are not really molds in the conventional sense of the word, since there are no flasks to hold the cope and drag, and the entire mold, or core as it is more commonly called, passes through conventional core ovens before it is poured. The complete mold assembly comprises cope and drag, plus a combustion chamber core and two rocker box cores securely positioned in the mold cavity.

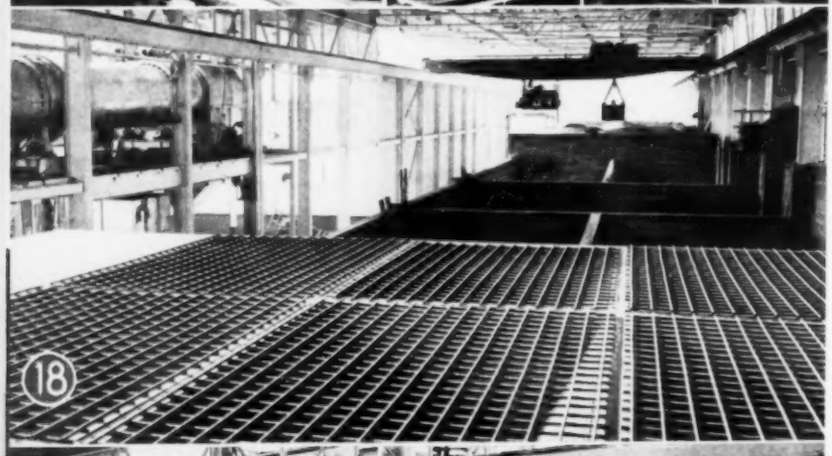
Four lines of molding machines are grouped along either side of two core ovens. The line on one side of the oven supplies the cope and the line on the opposite side the drag section of the mold. As the molds are drawn from the machines, they are given a casein spray and placed carefully on trays carried by overhead chain conveyor and moved through the baking oven, where an even temperature is maintained by oil burners and thermostat control. Emerging from the baking oven, the molds pass through a long cooling hood and are transferred to gravity roll conveyors. Gages check dimensions closely for "high"

Fig. 11—Loading and unloading stations of 14-spindle, rotary, airless shotblasting machine used in cleaning operations. Fig. 12—One section of final cleaning, inspection and shipping conveyor. Fig. 13—General view of cleaning benches served by overhead conveyor. Note universal vise at right foreground. Fig. 14—Typical cleaning bench where operators with portable tools complete detail finishing work on castings









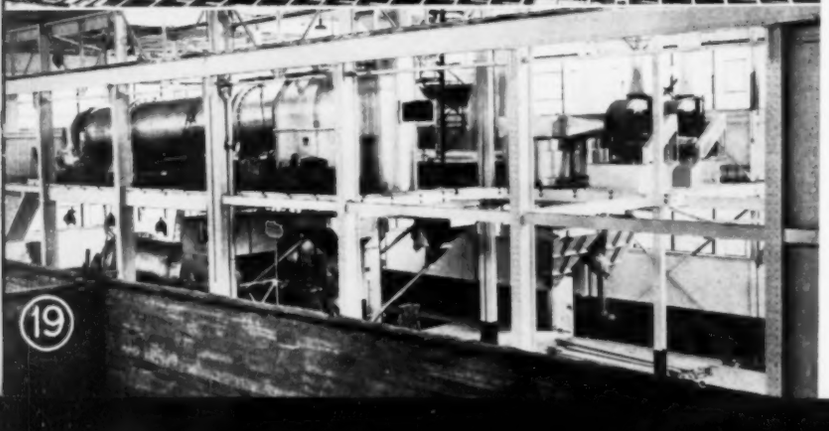
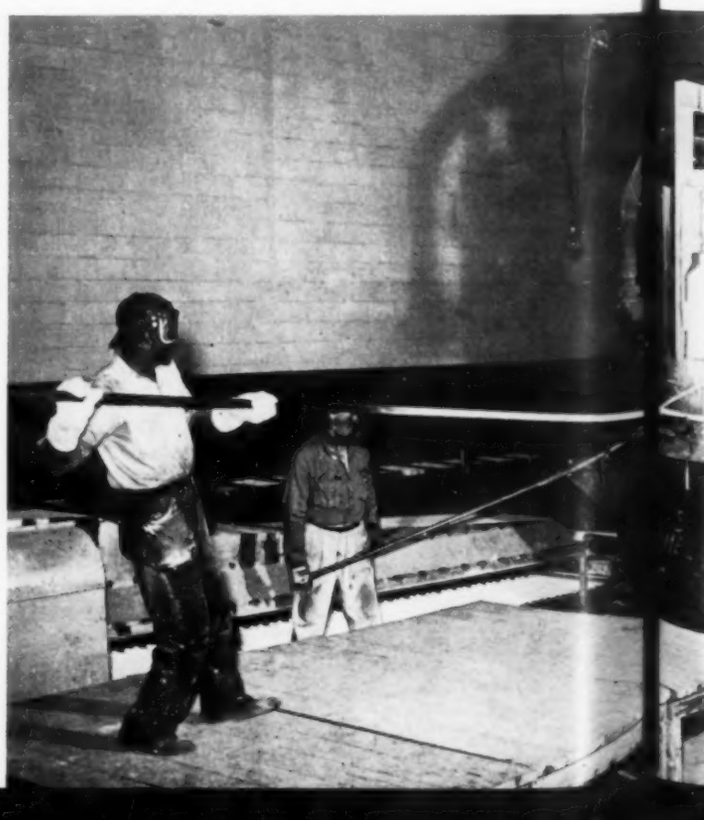


Fig. 15—Cylinder head casting mounted in fixture for air and water tests. Several tests are given to all castings during course of cleaning operations. Fig. 16—Automatic boxing machine simultaneously pasting top and bottom of shipping cartons. Fig. 17—Monorail crane for delivering core sand from mixers to hoppers over molding machines. Fig. 18—Sand shed with mixing room hoppers in foreground. Sand reclaiming unit is shown at left. Fig. 19—Sand reclamation department showing two 45-foot rotary kilns and cooling mills. Fig. 20—Cleaning dross from bath in one of the two remelt furnaces used in the plant. Fig. 21—Charging end of the oil-fired remelt furnace used for reclaiming all process scrap

or "low" pieces, after which they are blown clean and sprayed with a fluoride solution which serves to insure a close grain structure and to minimize shrinkage.

Drag and cope sections of the mold then travel through the drying oven which has a cooling chamber of sufficient length to bring the molds almost to room temperature when they emerge. They are then transferred to another conveyor and move to assembly benches, where rocker box cores are set in place with molten resin, a special fixture being provided to spot them accurately in the drag while they are being positioned. Combustion chamber core also is set in place on these benches, its outer end extending through semicircular openings forming the pouring gate in the two mold halves, wires or chaplets serving to hold it securely.

Before the two halves of the mold are joined, they are sooted with a swinging acetylene burner flame. A special assembly fixture, built into the roll



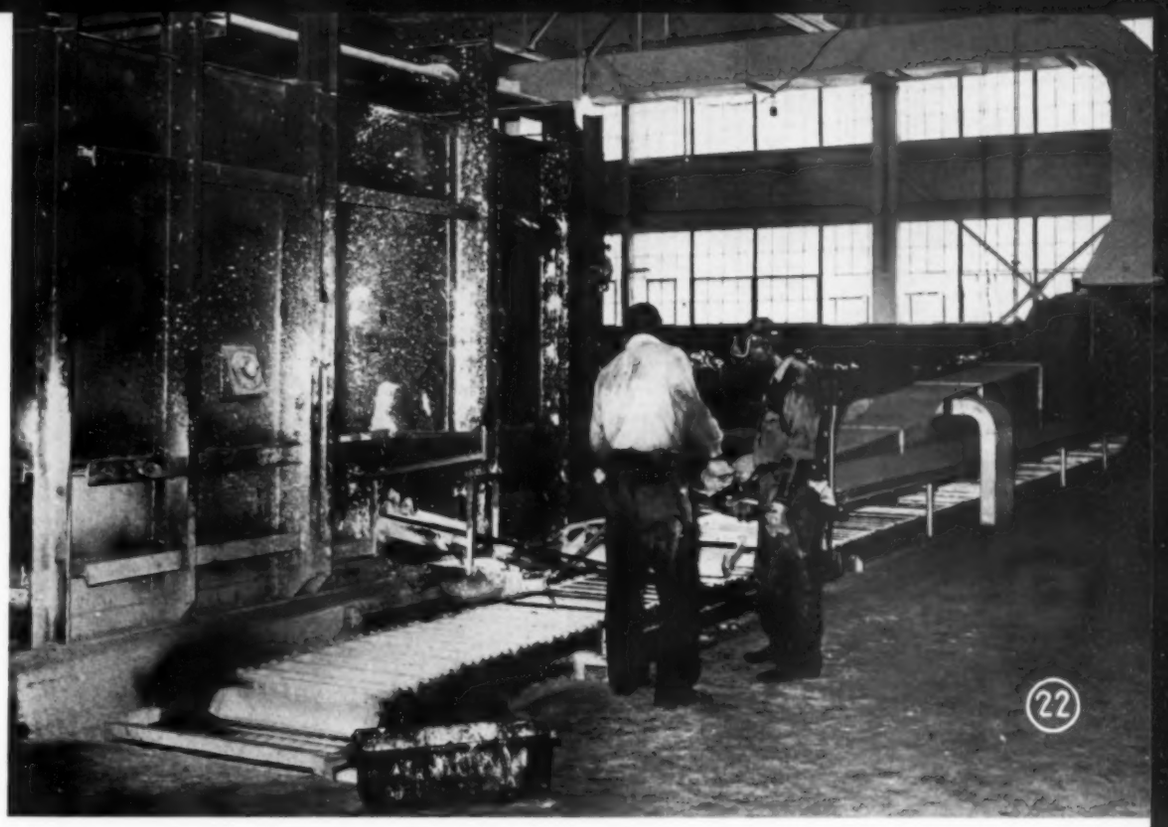
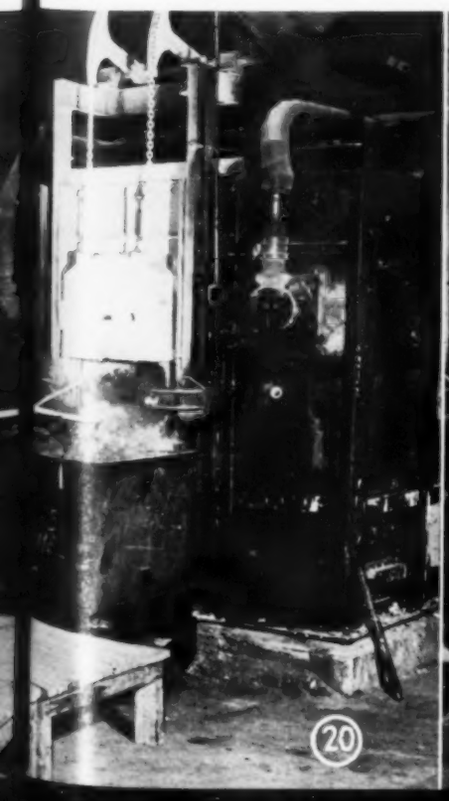
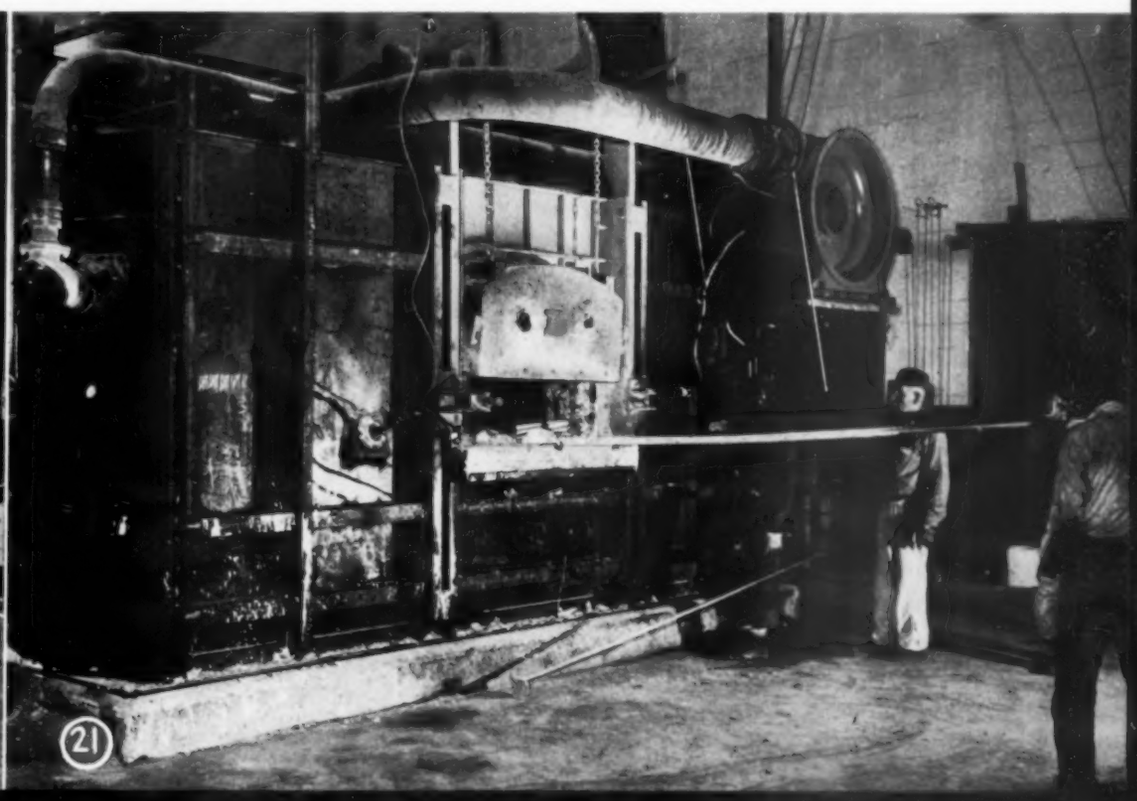


Fig. 22—Tapping remelt aluminum into ingot molds from furnace. Note duct system over filled molds to remove heat

conveyor, facilitates the accurate spotting of the cope on the drag. A pneumatically controlled table, on which one half is located carefully, swings down in such a way as to permit the mating half to be set in position, the assembly then swung back on edge, with the pouring gate on top, while metal clamps and wedges are applied to the sides to hold the two halves together after pasting, rather than the usual mudding operation. Complete mold or core weighs 275 pounds, the cope alone 130 pounds. An air hoist then transfers the mold to a pouring board, accommodating five molds in line, which travels along a roller conveyor past the pouring station.

Use of standard jigs and pattern plates throughout the molding operations insures each molding going together smoothly, with no fitting or touch-up needed along the line. Molding machines are of a special type designed solely for this operation. They are rollover swingout type coremaking machines, heavier than is customary, with large draw rods adjustable to take up wear. The hydraulically controlled drawing action is very precise and can be regulated to a nicety for a slow draw. With this type of machine, on the design of which Buick engineers collaborated, it is fairly easy to train new operators, since most of the care and precision required are built into the machine. Air lock levelers, vibrating mechanism and other parts are ruggedly designed, making the new machine a success in service and now sought by other producers of aluminum cylinder heads. Each machine, as installed, is fully insulated from the floor of the plant, being mounted on an individual concrete pad. The cylinder head is surrounded on the outside by a number of closely-spaced deep fins, to insure ample cool- (*Please turn to page* 150)





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WOBURN · BOSTON · MASS.
HEAT AND CORROSION RESISTING ALLOY CASTINGS FOR WAR AND PEACE
SA ALLOYS COVER THE RANGE

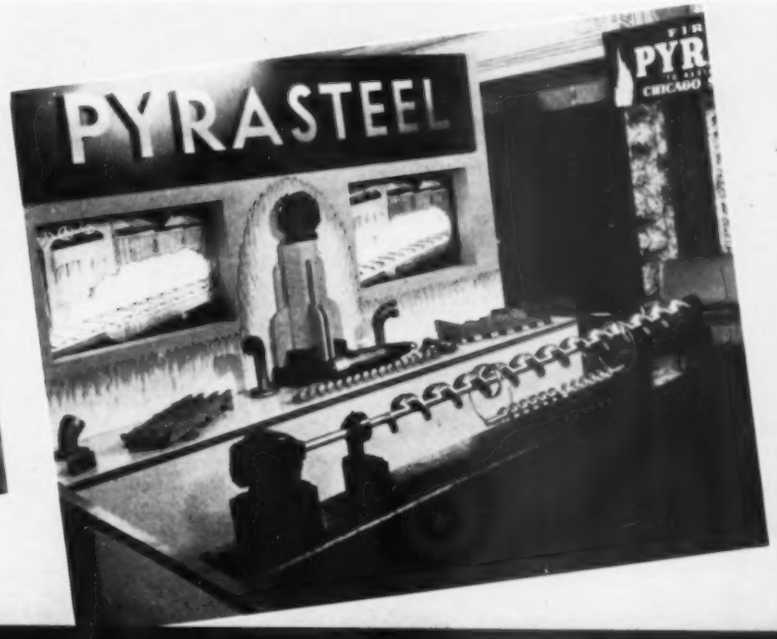
CASTINGS *featured at* METAL SHOW

HOW the foundry industry is aiding the war effort was illustrated clearly in displays of castings at the National Metal Congress and Exhibition, held at Cleveland, Oct. 12 to 16 in connection with the twenty-fourth annual convention of the American Society of Metals. Other organizations participating included the American Institute of Mining and Metallurgical Engineers, American Welding Society, and the Wire Association. Of the foundries exhibiting over twenty joined in presenting a co-operative display covering a wide range of products.

Included in the foundries with exhibits were: Alloy Castings Co., Champaign, Ill.; Aluminum Co. of America, Pittsburgh; American Magnesium Corp., Pittsburgh; American Manganese Steel division, American Brake Shoe & Foundry Co., Chicago Heights, Ill.; Ampco Metal Inc., Milwaukee; Atlas Foundry Co., Detroit; Banner Iron Works, St. Louis; Barnett Foundry & Machine Co., Irvington, N. J.; H. W. Butterworth & Sons, Bethayres, Pa.; Chicago Steel Foundry Co., Chicago; Dow Chemical Co., Midland, Mich.; Duraloy Co., Scottdale, Pa.; Farrel-Birmingham Co., Ansonia, Conn.; Florence Pipe Foundry & Machine Co., Philadelphia; Fulton Foundry & Machine Co., Cleveland; General Alloys Co., Boston, Mass.; General Foundry & Mfg. Co., Flint, Mich.; Greenlee Foundry Co., Chicago; Hamilton Foundry & Machine Co., Hamilton, O.; Kanawha Mfg. Co., Charleston, W. Va.; Kinney Iron Works, Los Angeles; Koehring Co., Milwaukee; Lake City Malleable Co., Cleveland; Ohio Steel Foundry Co., Lima, O.; Henry Perkins Co., Bridgewater, Mass.; Pohlman Foundry Co., Buffalo, N. Y.; Rosedale Foundry & Machine Co., Pittsburgh; Ross-Meehan Foundries, Chattanooga, Tenn.; Stearns-Rogers Mfg. Co., Denver, Col.; Sterling Alloys Inc., Woburn, Mass.; Valley Iron Works, St. Paul, Minn.; Vulcan Foundry Co., Oakland, Calif., and Warren Foundry & Pipe Corp., Phillipsburg, N. J.

Attendance at the congress reached a new high with total for the week of over 46,000. Registration at sessions of the four societies also hit a new high of over 23,000. All sessions were well attended with as many as 1800 attending a single session. Chicago has been selected for the National Metal Congress and Exhibition in 1943.

Of the numerous ses- (*Please turn to page* 154)



Every foundry executive and every foundry instructor should study this article, which originally was presented during the recent Cleveland A.F.A. convention under the auspices of the Committee on Co-operation with Engineering Schools.

The College Graduate LOOKS AT THE Foundry Industry

DO YOU remember the young man who attended the college training session at the Chicago AFA convention 2 years ago, and who wanted badly to work in a foundry and couldn't find a job? He was intrigued by foundry technique. He had completed all the undergraduate foundry courses he could get in the University of Minnesota, and had gone on to a master's degree in foundry technology. He wished to make the foundry his life work, and applied for employment in practically every foundry in the Midwest. But nobody wanted him. He made a splendid impression upon all of us. Recruiting officials of the power, chemical, telephone and automobile industries fight over men of this type. But he couldn't beg his way into a foundry.

It seems to me that this young man just about tells the story. With notable—and most occasional—exceptions, foundrymen are little interested in college trained men. Personnel officers of General Motors, Westinghouse, Standard Oil, Pratt and Whitney, General Electric and many other corporations come to the University of Detroit, and to other institutions, to hire graduates. But nobody has come to the university to hire for a foundry, neither this year nor any other year.

To determine if all this is more than superficial impression, and to find out just what the college graduate sees when he looks at the foundry industry, we decided to ask him.

With the help of Professors White and Hawley of the University of Michigan, Dean Dirks and Professor Miller of Michigan State College, and Professor Duncombe and Linsenmeyer of the University of Detroit, we got in touch with 185 metallurgical and mechanical seniors of the 1942 class in the three institutions. They ought to be a representative sample. The three schools are, respectively, a strong state university with a national clientele, a strong land grant college with an important out-state clientele, and a private, urban school with a metropolitan clientele. And besides, Michigan is an important foundry state.

We asked the boys three questions. First: *Have you ever considered a career in the foundry industry?*

Replies showed 145 out of 185 seniors, or 78 per cent, had never thought even for a moment about a foundry career,

The second question: *Why have you, or why have you not, considered a foundry career?*

The following answers are typical:

1. "It seems that foundry work requires more practical experience than anything else, and a technically trained man would have less (*Please turn to page* 156)

By C. J. FREUND
Dean of Engineering
University of Detroit
Detroit

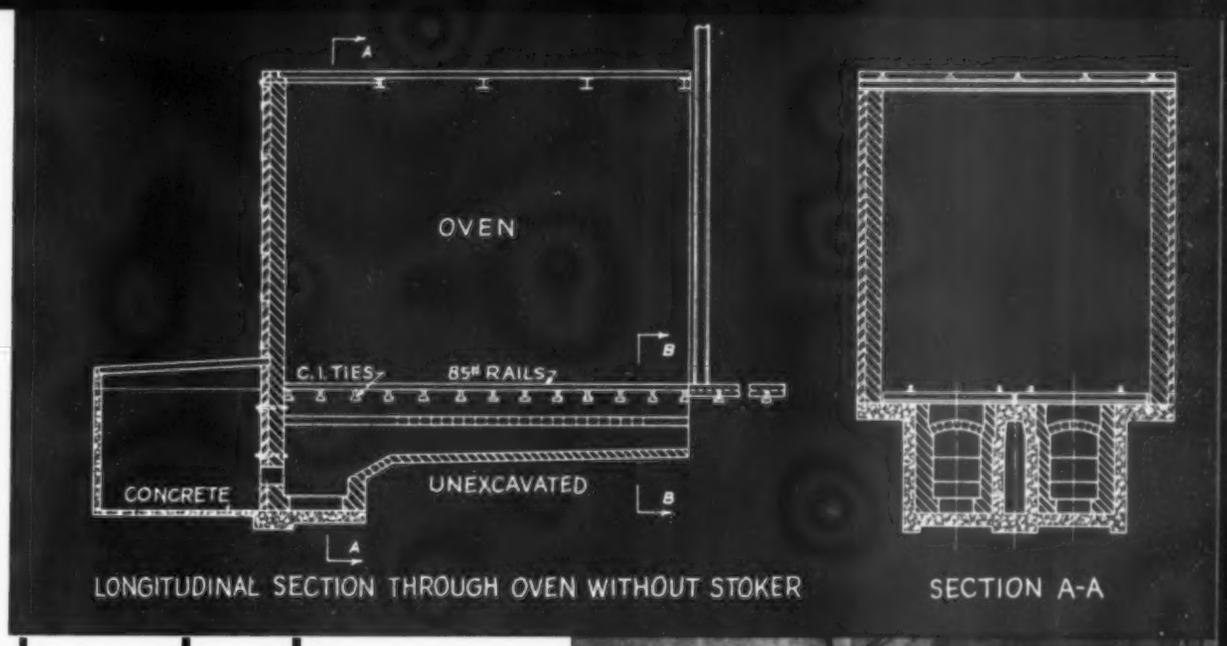


Fig. 1 — (Right) Cross section through the firebox before installation. Fig. 2—(Center) Stokers on special ovens. Fig. 3—(Below) Stokers in place

coal stokers for CORE OVENS

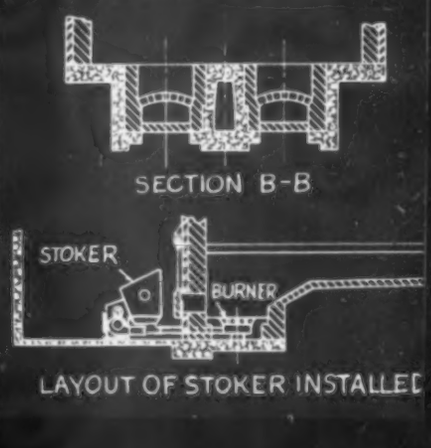
By ARTHUR ROBERTS JR.
Chief Engineer
Lynchburg Foundry Co.,
Lynchburg, Va.

IN MANUFACTURING large special iron castings there are always cores to be dried and in the majority of cases the mold also has to be dried. At the plant where our large castings are manufactured we have several core ovens for that purpose.

Several years ago all of these ovens were heated from the bottom by direct fire. The heating medium was coke and all ovens were hand-fired. Naturally, with such an arrangement, we had no control over the temperature in the ovens. It all depended on how our fireman was feeling. Some days we would have a car of cores burned while a few days later none of the cores would be dry. Such an antique method of drying cores and molds was most unsatisfactory. It was expensive and entailed loss of core production, casting production, labor, material and time.

We desired to improve the condition by the cheapest and most desirable method suitable for our locality. Neither oil nor natural gas was available so these two popular means of core oven heating were out of the picture Therefore, stokers were, selected for the ovens as coal is our most natural medium of heat. We could install these with only minor changes in the fire boxes and the ovens would be out of service only a short time.

These ovens are still direct-fired. Therefore, they are not the recirculating type, but we do have control of the temperature in the ovens and the direct cost for core drying has dropped considerably. This saving in fuel (*Please turn to page* 160)



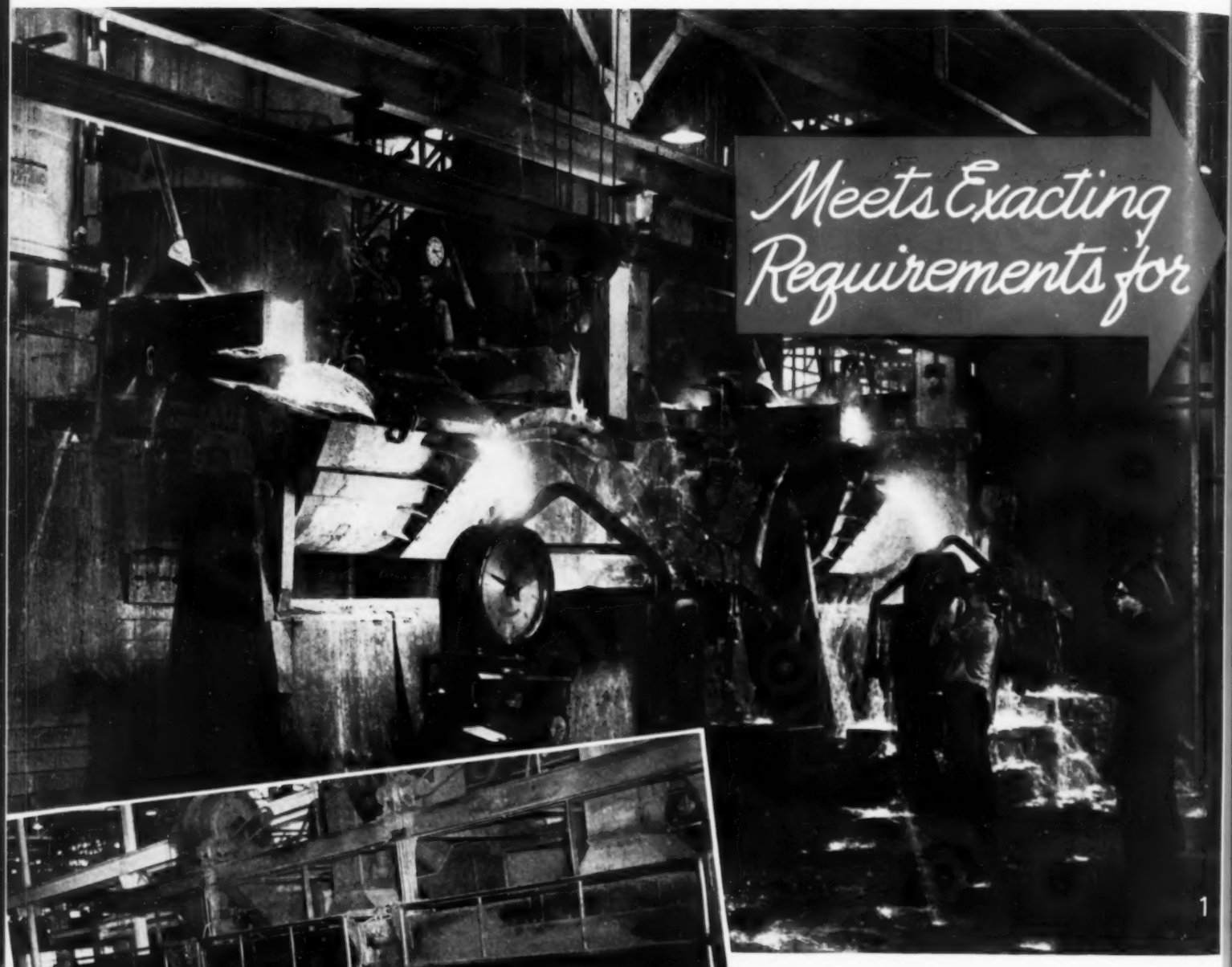


Fig. 1—Metal from the cupolas flows into receiving ladles and then into ladles mounted on scale cars. Weight and temperature are checked. Fig. 2—Molds are dried in continuous type ovens open at both ends and with temperature zones separated by air curtains

Machine Tool Castings

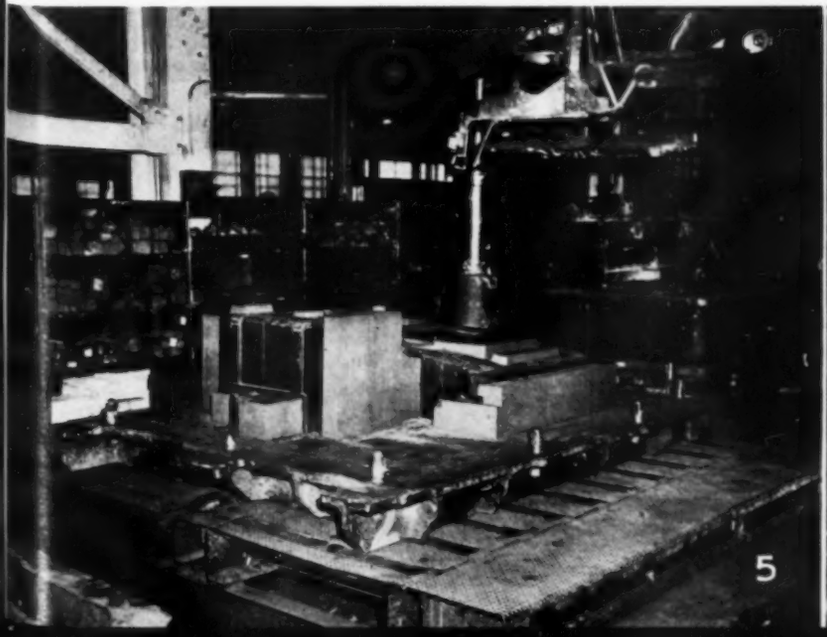
By PAT DWYER

THE NEW gray iron foundry of the Cincinnati Milling Machine Co., was designed specifically for the speedy and economical production of castings for a wide range of machine tools including milling machines, cutter sharpening machines, broaching machines and grinding machines, plus many adaptations. Machines range in weight from ¾ to 65 tons and in horsepower from ¾ to 186. All of which would seem to justify the company's record of being the largest producer in the world of machine tools, with the greatest output per square foot of floor space.

With the exception of the small molds made in snap flasks, and the long grinder bed molds made in a long partitioned pit in the floor, all the molds are made in steel flasks. Through careful planning and design the total number of more than 100 flask sizes has been standardized to eight. The length and width of each size is constant and where the depth has to be increased, one or more unbarred units are clamped together with a barred section. Flask joints are planed and holes in the flanges are drilled through a jig. Instead of the usual clamps and wedges, substantial steel pins and tapered keys are employed to hold the units of a deep drag or cope together, and in fastening the cope to the drag. The slotted pin is dropped through corresponding holes in both flanges and the tapered key is tapped into place with a hammer. Later, after the casting is poured, the key is knocked out with a hammer and the pin is removed. The method is simple and reliable and the keys and pins are retrieved more readily than clamps and wedges.

Sand for the large skin dried molds is prepared in a battery of three muller type mixers each enclosed in a dust proof housing and operated semiautomatically. Measur-

Fig. 3—Molds moving along on a power conveyor are filled with sand at one station, jolt rammed at another and then rolled over on a large powerful machine. Fig. 4—Molds for large castings are made in heavy steel flasks planed on the joints and with sections held together with tapered steel keys driven through slots. Fig. 5—Larger molds are built up progressively on a power conveyor. Fig. 6—Long grinder beds are molded in a concrete walled pit in the floor. The illustration shows a completed mold with most of the cores in place



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6

ing devices control the amount of sand, water and other ingredients in each batch. As pointed out in a previous article only two base sands are employed for molds and cores. By varying the proportions of these bond free sands in the mixture, a suitable grain size and permeability can be secured for the various classes of castings. One sand has an average grain size of 70 mesh while the grain size of the other is 120 mesh.

A typical batch of sand for the heavy skin dry floor contains 2500 pounds old sand, 75 pounds coarse new sand, 70 pounds fire clay, 30 pounds pitch. This sand has a permeability of 150 dry, and 30 pounds dry tensile strength. Sand mixture for the smaller castings made in skin dried molds contains 1200 pounds old sand, 50 pounds coarse new sand, 30 pounds fine grain new sand, 20 pounds pitch, 27 pounds clay and 1 pound cereal binder. Permeability, dry, is 130 and dry tensile strength is 30 pounds. Moisture in both mixtures in the green state is held to between 5.5 and 6.00 per cent.

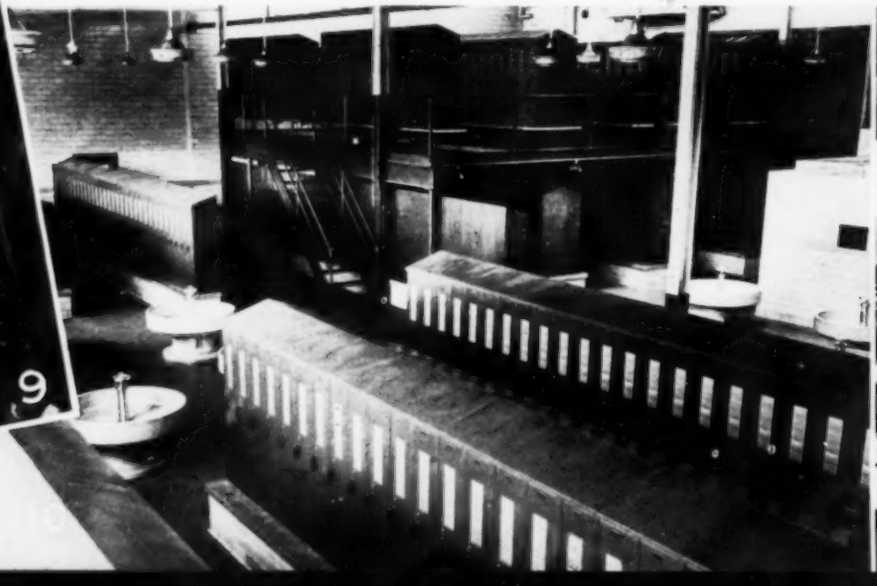
Sand for the small green sand molds made on a straight line battery of molding machines under a line of sand hoppers contains old sand 1200 pounds, fine new sand 38 pounds, coarse new sand 12 pounds, bentonite 2½ pounds, 15 pounds fire clay, and shows a moisture content of 4½ to 5 per cent, permeability 40 and green strength 6 pounds.

Sand Samples Tested Continuously Throughout Day

All new sand for the cores is prepared in two mullers located close to the north wall of the foundry in the vicinity of the coremaking department. The mixture contains 1025 pounds 70-mesh sand, 310 pounds 120-mesh sand, 10 pounds cereal binder, 33 pounds silica flour, 30 pounds clay. The sand is further bonded with raw linseed oil in various amounts, ranging from 3.0 to 3.5 gallons, depending on whether the resulting cores shall be hard, medium hard, or comparatively weak. In the green state the sand has a moisture content of 4.00 per cent and 1 pound green tensile strength. In the dried state the permeability is 130 and the maximum tensile strength is 200.

In a well appointed laboratory samples of sand are tested continuously throughout the day and night for moisture content, permeability, grain size and strength. Analysis also is taken on raw materials, pig iron, fuel oils, linseed oil, limestone, coke and scrap metal. Temperature of the metal as it flows into the ladles is taken by optical pyrometer. A sample of metal is taken from each ladle and poured into a wedge test block which is broken and the character of the fracture noted before the metal is poured into the mold. The depth of chill indicates to the experienced observer whether or not the metal is of the proper grade. This is the quick routine shop control test. The more elaborate tests are conducted in the laboratory to control and maintain the desired chemical and physical properties of the metal within the somewhat narrow specifications.

Small blocks of sand with the wedge cavity in the center and into which the test iron is poured, are made on a core blowing machine. The machine also is employed in the production of a wide variety of small cores, including strainer cores and runner basin cores used on all the larger molds. Recognition is taken of the fact that a perfectly clean runner basin, sprue, runner and gate are essential to the production of clean castings. To that end a definite standardized gating system has been established. Shape, number and position of the gates vary with the shape and size of the casting, but the general principle is to provide a runner passage in the cope which delivers metal to a number of small gates in the drag. (*Please turn to page* 161)



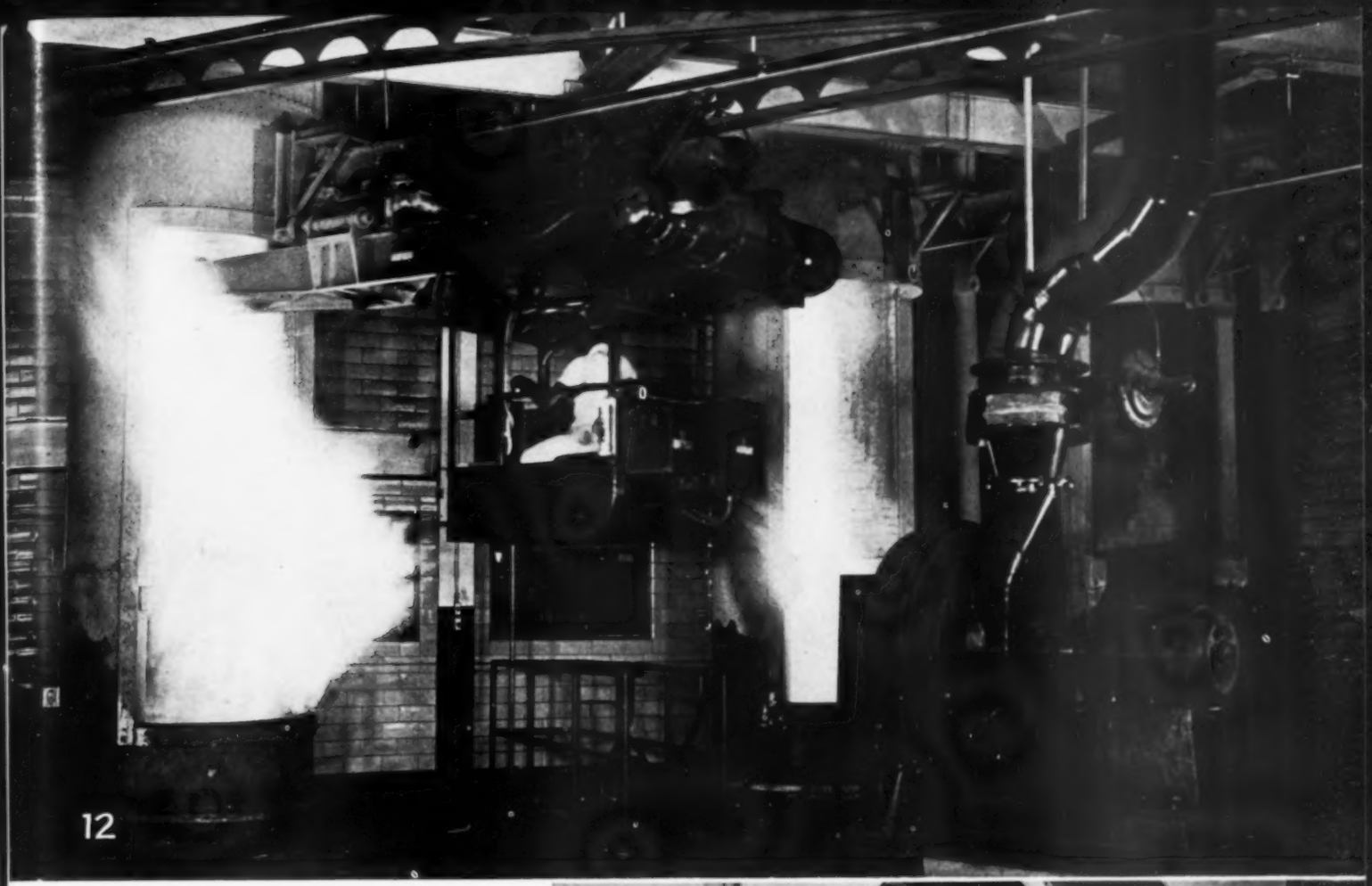
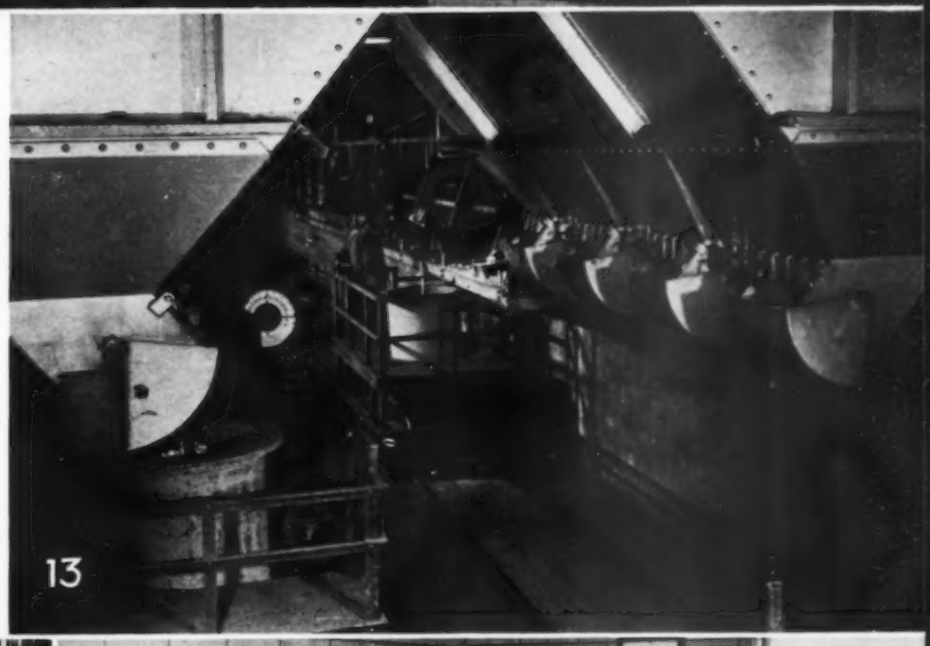


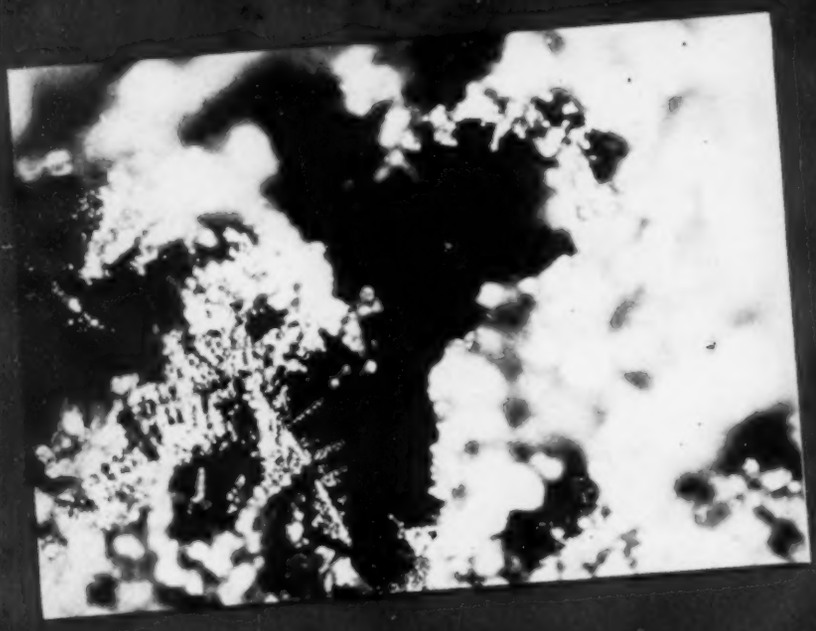
Fig. 7—Small green sand molds receive metal from a covered, insulated ladle. Fig. 8—Coke from the cupola drop falls into a container with open top and bottom on a truck. Fig. 9—Slag accompanied by a stream of water flows into a steel container and disintegrates readily. Fig. 10—Adequate washroom, lockers and toilet facilities are provided. Fig. 11—A well lighted and equipped pattern shop facilitates construction and repair of all patterns. Fig. 12—Cupola blowers take air from a pipe through the roof. Fig. 13—Cupola charges are made up in steel buckets on scale cars. Fig. 14—The medical department is equipped and staffed to care for employes health

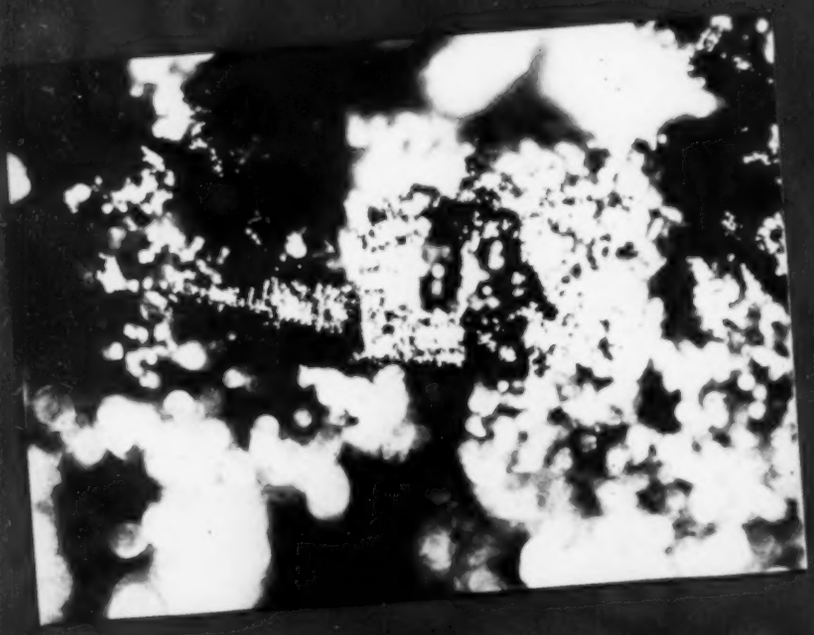


FOUNDRY EQUIPMENT MANUFACTURERS Consider War Production Problems

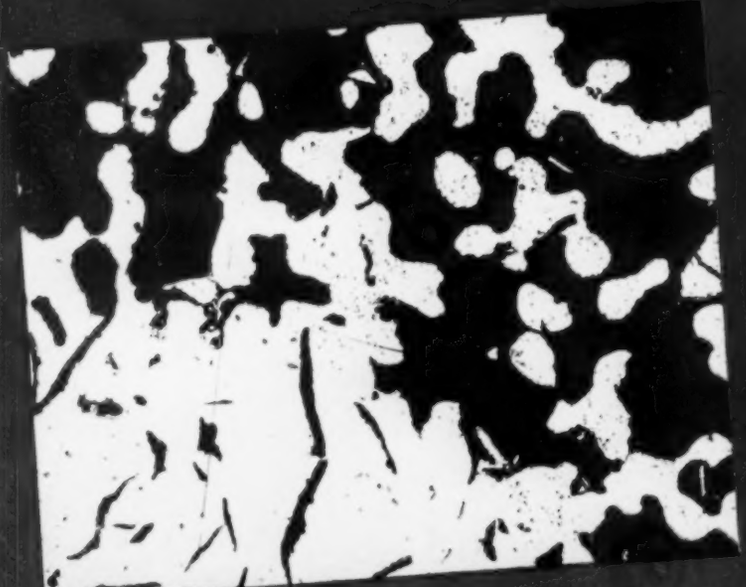
ANNUAL meeting of the Foundry Equipment Manufacturer's Association held in Cleveland, Oct. 30 and 31, was devoted chiefly to consideration of problems of manpower, salvage, the procurement of materials, and the possible field of foundry equipment after the war.

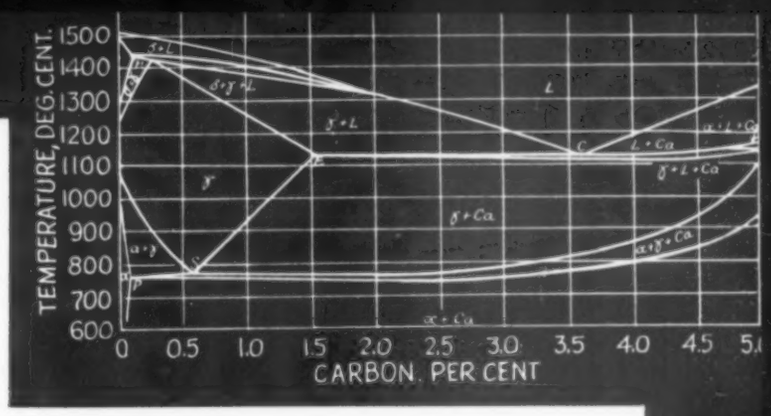
In his opening remarks President Potter emphasized the importance of foundry equipment in the manufacture of war materials. In his opinion, the industry has the immediate responsibility to the war effort of completing its backlog of orders just as quickly as possible. He pointed out that the time probably is coming when the manufacturers of foundry equipment may be called upon to use their facilities for the production of direct war materiel instead of the peace time product. Mr. Potter praised the work of W. R. Bean, chief, Foundry Equipment and Supply Unit, Tools Division, War Production Board, Washington, for his able assistance which has made it possible for the foundry equipment (*Please turn to page* 164)





Theory of Shrinkage in GRAY CAST IRON





By GEORGE A. TIMMONS
Metallurgist
Climax Molybdenum Co.
Detroit

THE term *shrinkage* has at least two interpretations to the gray iron foundryman. The first interpretation considers the total volume change which occurs over the temperature range between pouring temperature and room temperature. While the iron is completely liquid, the entire mold is filled, but after the iron has solidified and cooled to room temperature the casting is smaller than the mold due to a slight contraction which has taken place. This phenomenon is understood readily and the volume change is anticipated by the foundryman who makes his pattern and mold sufficiently oversize to account for the contraction, and thereby holds his dimensions to the desired tolerances.

The second interpretation of the term *shrinkage* when applied to gray iron castings is concerned with a type of defect which is also referred to as *porosity*, *sponginess*, *voids*, or *draws*. The topic of this discussion is the second interpretation. The various factors which influence this type of shrinkage will be discussed to provide a clearer understanding of the problem so it can be considered on a sound basis, enabling the foundryman to exercise as much control over its occurrence as possible, thus reducing to a minimum rejections due to its presence.

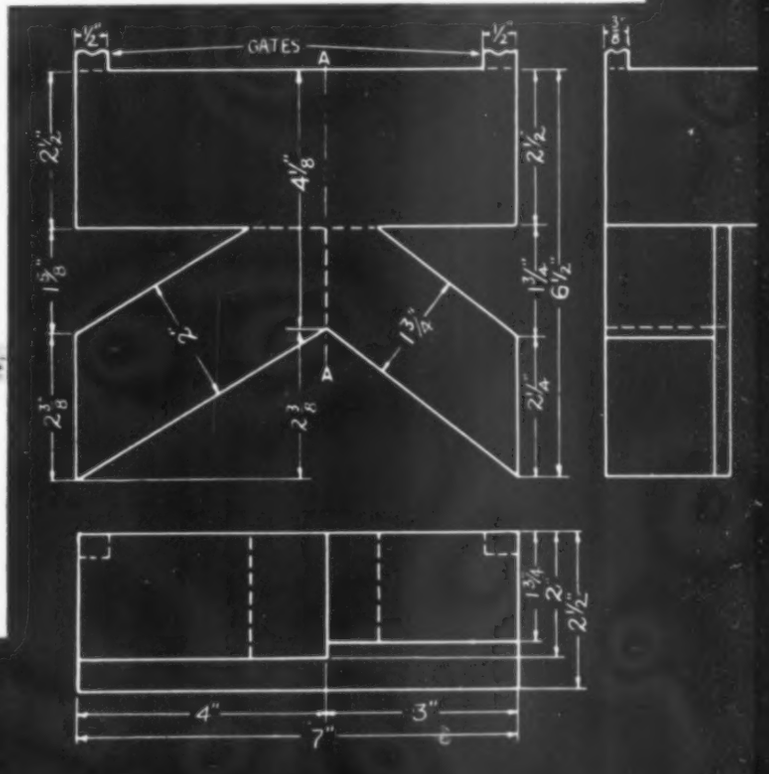
Shrinkage or porosity occurs in castings as irregularly shaped cavities, or groups of cavities. These cavities generally are characterized by the presence of dendritic crystals on the interior surfaces or a series of interdendritic voids within a certain localized zone. Such defects usually are found near the centers of heavy sections or near a change in section size. Occasionally they are found in thin interior wall sections of such complicated castings as engine blocks or pumps. In such castings they frequently are hidden until after the casting has been partially machined. Many castings may contain such porous areas, but in numerous cases these defects occur in sections which are not subjected to high stress nor where the part is responsible for the confinement of some liquid or gas under pressure. Again, the defects may occur in locations where they later are removed completely by machining. In such cases they are of no immediate concern to the foundryman. But, when shrinkage or porosity occurs in pump castings or air compressor cylinders, in the oil line of an engine block, or near the highly stressed rim of a flywheel, it is the source of considerable consternation and every effort must be expended to eliminate it.

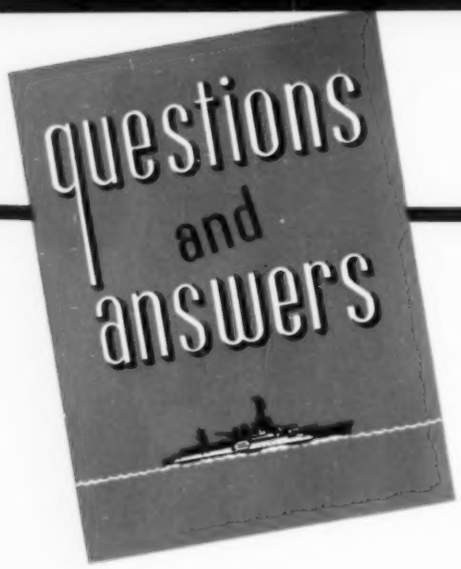
Shrinkage is a direct result of contraction of the metal upon changing from the liquid state to the solid state when there is insufficient metal to feed the defective location. (*Please turn to page* 166)

Figs. 1 *and* 2 (*Upper left and left center*)—*Partially formed dendrites in shrinkage cavity in heavy pump casting. Unetched,* 100 *diameters. Fig.* 3 (*Lower left*)—*Interdendritic voids in spongy section of cast iron cylinder wall. Unetched,* 100 *diameters. Fig.* 4 (*Left*)—*Fractures of K-bars of compositions shown below showing locations and characteristics of sections containing shrinkage defects. Fig.* 5 (*Upper right*)—*Equilibrium diagram for Fe-C-Si at* 2 *per cent silicon. From Alloys of Iron and Silicon, by Greiner, Marsh and Stoughton. Fig.* 6 (*Right*)—*Shape and dimensions of K-bar*

Data for Fig. 4

Heat No. 1667		Heat No. 1661		Heat No. 1662	
T.C.	3.20	T.C.	3.13	T.C.	3.16
Mn	0.76	Mn	0.78	Mn	0.76
Si	2.21	Si	2.42	Si	1.90
S	0.105	S	0.092	S	0.090
P	0.109	P	0.112	P	0.113
Ni	1.56	Ni	1.56	Ni	. . .
Cr	0.78	Cr	0.74	Cr	. . .
Mo	. . .	Mo	0.55	Mo	0.80





Cast Nonferrous Alloy Will Not Serve for a Spring

We have been using No. 18 phosphorus spring bronze for trolley harp contact wheels for electric trolley cars. That spring makes contact with a brass spring which it holds in position against the trolley wheel. It seems that this particular kind of metal cannot be obtained any more. We operate a small foundry and thought that you might be able to recommend a substitute.

There is little or nothing available in the nonferrous field which will give the necessary spring pressure except hard rolled or hard worked bronze such as the No. 18 which you mention. To attempt to make a spring from a cast material is unwise since it has little resiliency which forms the foundation of a spring. War conditions have necessitated changes to other materials, and in your case you may have to use a steel spring, increasing its cross section to insure the desired conductivity. Bronze has a much higher conductivity than steel, but since you are using brass for a contact, it may be that conductivity is not so important in the particular construction you mention.

Wants Information on Proper Baking Time for Big Cores

We have installed a direct, gas-fired, recirculating, car-type core baking oven, and will appreciate any information you can supply on the following: (a) With the oven operating at 500 degrees Fahr., and charged with approximately 28,000 pounds of cores, size 2 x 2 x 8 feet, 3 per cent moisture, and approximately 10,000 pounds of steel, what period of time is necessary for proper bake? (b) Is there any information on the baking time per unit weight of core or per inch of thickness?

You undoubtedly are familiar with the fact that in heavy cores, it is not necessary to have them thoroughly dry as in the case of light cores. Consequently, the heavy cores are dried to some predetermined depth, usually depending upon the degree to which they are surrounded by molten metal. That is to say that a core completely surrounded by molten metal should be dried much deeper than one only partially surrounded. The essential point in drying is to have a uniform depth all around, and not a condition whereby one area is dried to a depth of 8 inches or even more and another to only 2 or 3 inches.

With the cores you mention, 2 x 2 x 8 feet, we believe that a drying depth from 5 to 6 inches should serve satisfactorily under all conditions, but of course, may be more or less as experience dictates. While some believe that the average drying rate of large cores is 1-inch per hour, careful investigation shows that the average rate is approximately ½-inch per hour at a temperature of 475 to 500 degrees Fahr. because drying proceeds inversely as the time due to a number of factors including insulating properties of dry sand, rate of migration of the moisture from interior to exterior, etc.

Consequently a satisfactory baking cycle will require about 12 hours, of which 8 hours will be needed to bring the cores up to temperature (475 to 500 degrees), and 4 hours for soaking at that temperature range. You do not give any data on the oven you are using so it might be well to point out that the figures presented are based on the load of work consisting of 28,000 pounds of cores and 10,000 pounds of steel, handled in an oven equipped with a heating system employing 1,500,000 b.t.u. input per hour, recirculating air. Using city gas of around 500 b.t.u. the hourly consumption would be approximately 3000 cubic feet per hour. Using oil, in event that a combination oil and gas burner would be employed, the maximum consumption per hour would be around 13 gallons with an average during the day of 8 gallons per hour.

Coke and Iron in Cupola Drop Are Recovered Easily

What is the usual present day practice for reclaiming coke and iron from the cupola drop in a foundry melting between 12 and 20 tons?

Where the amount of coke and iron required for a heat is estimated properly and expertly, the drop from a (presumably) 54-inch cupola melting from 12 to 20 tons per day should not amount to more than 2 or 3 barrow loads. In common practice the dump falls on a frame made up of flat steel bars with the ends turned up. One transverse member rests against the door prop and a chain or steel cable is attached to one end of the device. When the time comes to drop the bottom, a loop on the free end of the cable, or a ring on the chain is attached to the crane hook. The chain or cable is reeved through a snatch block anchored in the floor or in the wall at the back of the cupola. In some instances the cable or chain is attached to a winch, or to a truck or tractor. A pull on the chain trips the door prop and then the drag carries the dumped material from the cupola for a short distance where it may be sprayed with water.

In some instances a flat tray is used instead of the open frame. In other instances a container mounted on wheels catches the dropped material. The usual method of picking the dump over by hand is fairly effective. The iron is returned to the charging floor. The usable coke may be

distributed through the cupola charge, but in many instances it is used in the core oven fires, in the interior of large cores and in the salamanders employed for heating the shop in winter. In some foundries a magnet suspended from the yard crane is employed to reclaim the iron from the cupola drop. In others the dumped material is put through a water mill.

Several Causes May Result in Spongy Bore in Casting

Sponginess and shrinkage areas show up in the hub of a gray iron wheel body casting 18 inches diameter and 18 inches high. A 4-inch core extends through the center. The hole later is bored out to 5 inches diameter and threaded. We have tried different styles of risers without effect. The cupola charge is made up of 100 pounds light structural steel scrap, 700 pounds cast iron machinery scrap, and 200 pounds pig iron showing silicon 3.00 per cent, sulphur 0.04 per cent, phosphorus 0.25 per cent, manganese 1.00 per cent. We shall appreciate advice on how to secure a solid casting.

Spongy and shrunken areas revealed only when the casting is machined may result from one of several, or from a combination of two or more causes. A more complete description of the molding, gating and risering methods would be needed before one could offer a definite diagnosis. The iron may be oxidized in the furnace or filled with steam from a wet ladle. The mold or core may be too wet or too hard. The gate or riser may be inadequate to properly fill and feed the casting. All these are possibilities. However, the most probable cause is the center core which is either not sufficiently dried, too heavily bonded, or not vented properly. The metal boils violently as it rises around this core and results in the sponginess, shrinkage and segregation of the metal in the vicinity.

As a first step in what may prove to be an elimination program, we suggest that you pay particular attention to the core. Preferably made as a unit and rolled out on a plate, it may also be made in halves and pasted. Maximum permeability is the main factor. Make the core from a free, open sand bonded with a minimum amount of oil or other binder. Provide a 1-inch diameter vent hole through the center and a suitable vent hole in the cope of the mold for the vent to escape. Incidentally we see no reason for providing ½-inch machining allowance in the hub. Time and metal may be saved and slightly denser metal will result from the use of a core 4½ inches in diameter.

Gives Data on a Composition To Meet Specification

We have a gray iron job that requires 30,000 pounds per square inch. Most of the castings weigh 1000 pounds and one weighs 6000 pounds. We use pig iron containing 2.73 per cent silicon, 0.44 per cent phosphorus, and 0.82 per cent manganese—and railroad steel scrap. We cannot buy nickel for the job. Will you please advise the mixture to use to obtain the required tensile strength, and any other information that will help in melting.

We assume that the tensile strength determination will be made on a test bar and not on a section from the casting, but it should not be difficult for you to meet the requirements if you are familiar with producing heavy castings. You do not mention what you have in the line of return or home scrap, and foreign or purchased gray iron scrap so all we can do is suggest a possible mixture for the work in hand.

Although you did not state the section thickness of the castings, the reference to weight indicates a heavy section. We believe a composition containing about 1.50 per cent silicon would serve satisfactorily. Since the silicon content of your pig iron is rather high, it must be diluted by additions of steel scrap, and heavy gray iron scrap to bring it down to the desired range. An appreciable amount of steel scrap will be necessary to accomplish that object, probably not less than 25 per cent, and perhaps more—depending on whether or not you have heavy gray iron scrap, low in silicon available.

Tentatively we suggest a mixture composed of 25 per cent steel scrap, 150 pounds of home scrap containing about 2.25 per cent silicon, 200 pounds of heavy gray iron scrap containing 1.50 per cent silicon, and 400 pounds of pig iron. That will result in a final iron containing about 1.60 per cent silicon, and should easily meet the specification on tensile strength. By leaving out the home scrap and substituting more heavy scrap, the final silicon will be around 1.50 per cent. Similarly if the steel scrap is increased at the expense of any of the other components the silicon will be decreased accordingly, since to all intents and purposes for calculation the steel contains no silicon at all. However, you are on the ground, and know the approximate silicon content of your available scrap. Hence, you will have to calculate the weights of the different components which will give you an iron containing between 1.50 to 1.60 per cent silicon, or less.

GANGWAY! By J. A. Patterson

"But how was I to know that air hose would come loose just as that girl from the office was passin' by?"

Metal Inserts on a Core Cause Blows

We are casting a large aluminum housing in which four steel inserts are put on the core. We seem to have trouble with only one, which is 1½ inches long and ⅛-inch thick. So far we have tried galvanizing, burning, washing with French chalk, sand blasting, running the metal away from it, running all the metal in against it, putting a riser on top, but it still continues to blow. There is no possible way to heat it. We make the housing in a snap flask.

Production of castings containing inserts requires careful attention to details to prevent defective work and the following practices have been found helpful in eliminating blows due to steel inserts:

Close attention to gating practice is probably the most important factor involved. The first metal entering the mold should enter toward the steel insert and should be directed so as to rise from the bottom of the insert to the top.

Cores should be stored in a warm place prior to use. Before placing in a mold a thin coating of acetylene black applied with a smoking acetylene torch is usually found beneficial.

In some instances warm sand causes trouble. A cold insert in a warm mold will condense moisture.

Plate Is Machined On Both Sides

We shall appreciate your suggestion on the best method of gating gray iron plates 10, 12 and 14 inches diameter and ½-inch thick. These castings are machined on the edge and on both sides and must be perfect.

These plates may be gated satisfactorily according to any of the three methods shown in the accompanying illustration. The first and simplest is the ordinary storage gate *A* in which the metal is poured into a central sprue, through a horizontal runner in the cope provided with a riser near each end, and then into the mold through two thin gates.

In the second method *B*, the metal is poured into a green or dry sand basin on top of the cope, and enters the mold through three or four ¼-inch diameter pencil gates.

The third method *C* is that employed in stoveplate and other light work foundries. The metal enters the mold through a knife or wedge gate. In some instances this gate as shown at *D* is formed in a dry sand core which is placed on the pattern and rammed up with the cope.

Wants Information On Cost Methods

We will appreciate any information in connection with labor cost accumulations in our gray iron foundry. Possibly there is some book on the subject that you can recommend.

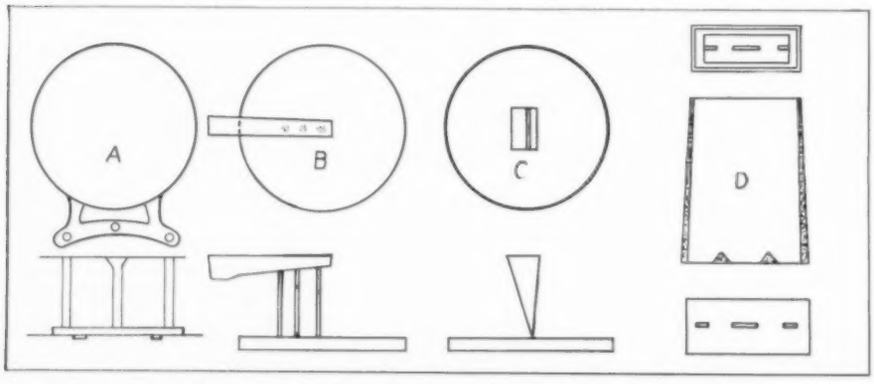
So far as we know there is no book treating directly with accumulation of foundry costs. Several articles have appeared in The Foundry which supply information along that line. It may be of interest to give a general outline of labor costs in a gray iron foundry as to kinds and distribution to castings made. It has been the practice of one well known foundry cost consultant to divide foundry labor into direct labor which can be charged to the individual job, and indirect labor which must be included in overhead, and charged indirectly to the job.

Direct labor is classified further and includes melting, coremaking, cleaning and pattern work. Theoretically the labor cost of preparing iron for pouring into molds is direct labor, but allocation of that labor to individual jobs can be made accurately and economically by including it with expenses incident to melting the iron and distributed to the individual jobs on the basis of weight.

Labor concerned with making of cores usually can be charged to the individual castings for which the cores are made. That labor usually includes ramming, baking, pasting, etc., and also includes cost of helpers as well as regular core makers. Major cost of molders and their helpers should be charged as direct labor in its application to individual jobs. There are several methods employed in cleaning castings. Some are tumbled in a mill or barrel, others are ground, brushed, abrasive blasted on a table, and by other hand cleaning operations. There are occasions when labor costs for tumbling may be charged direct to the job such as barrels running continuously on the same or similar patterns. In that case it is good practice to treat such labor as a direct charge. Otherwise it has been found most practical to charge the labor with other expenses incident to the barrel cleaning on the basis of weight of the castings cleaned. On other types of cleaning labor cost can and should be charged directly to the job affected.

In those shops where a pattern shop is maintained or labor is used in making or repairing patterns, such labor should be charged directly to the job. A more complete description of how that can be accomplished may be found in an article "Collecting Pattern Shop Data by Separate Jobs", by A. E. Grover, presented in the March, 1942 issue of The Foundry. Indirect labor may be classed as supervision, operating records, repairs and maintenance, handling materials and castings, and general indirect labor which comprises an accumulation of small labor charges; further classified for analytical purposes. Supervision should be charged to the foundry overhead expense on the basis of the number of employes supervised or the labor hours of those departments. According to the cost of maintaining operating records, the various foundry departments should be charged for that service. Labor cost of repairing and maintaining facilities of foundries should be charged directly to the department affected. Labor cost of handling materials and castings should be charged directly to the department incurring the charge. Analysis of the several items of the general indirect labor account will indicate which department should be charged, and the amount.

Overhead in the foundry should be distributed to castings on the following bases: Melting, weight of iron melted; coremaking, direct labor hours; molding, direct labor hours; barrel cleaning or tumbling, weight of castings barrel cleaned or tumbled (castings not tumbled excluded), other cleaning of all types on the basis of direct labor hours; pattern shop (see article previously mentioned). Since labor cost is a considerable part of the total cost of producing castings, it can be expressed both economically and accurately by the foregoing methods of distribution in the cost of the finished castings.



Sketch showing four methods of gating a flat plate

SEGREGATED *Scrap...*

is your link to VICTORY!

Scrap salvage is a vital factor in the war effort. To be fully effective a scrap program must include methods for segregating and conserving critical alloying elements so urgently needed in the construction of tanks, guns, ships and planes.

Ferrous and non-ferrous metal scrap should be collected in separate containers at the machine where they are generated. Each class of high-speed tool steel and each type of constructional alloy steel should likewise be kept separate so that the alloy content can be returned to service.

Remember, — alloy scrap which is segregated, classified and labeled according to type and composition is a vitally important commodity today—and urgently needed to augment primary supplies of Nickel, molybdenum, tungsten, etc.

The metallurgical experience of our technical staff is available to aid you in these and other phases of metal salvage.

KEEP SCRAP MOVING INTO WAR PRODUCTION!

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

Increase Carbon in Converter Blows

We operate a converter steel casting foundry and wish to increase the carbon content of some heats. We have tried using coal and coke but they float on the surface and are not absorbed.

The best way to add carbon to converter blows when the usual recarburizers do not contain enough is to add cupola metal—the same as is used to charge the vessel, catching it in a small ladle. Sometimes the schedule will permit it to be taken from the ladle for the next blow; pouring out enough for the purpose into a small ladle or shank and adding it to the metal in the converter. After pouring it in the converter should be rocked back and forth a few times to insure thorough mixing.

The amount of cupola metal is calculated as follows: Suppose the blown metal weighs 4000 pounds, and it is desired to add 12 points of carbon or 0.0012 per cent. Also allow 3 per cent carbon in the cupola metal. There will be quite a little of the latter so its weight must be taken into account in figuring. Let X be the amount of cupola metal to be added and then

$$\frac{0.03X}{4000 \text{ plus } X} = 0.0012$$

(that is, the pounds of carbon in the cupola metal, 0.03X, divided by the combined weight of blown metal and cupola metal, 4000 plus X, equals 0.0012 per cent.)

Solving the equation, X equals 170 pounds of cupola metal to be added. Since the cupola metal will contain some 1.8 per cent silicon, the addition of ferrosilicon can be reduced. The calculation is as follows: 170 times 0.018 equals 3.06 or the amount of silicon in the cupola metal to be added. That is equivalent to about 6 pounds of 50 per cent ferrosilicon which should be reduced accordingly. It will be necessary at first to weigh the amount of cupola metal in the small ladle, but after a short time it can be estimated closely enough.

Make Runner Cups On Jar Machine

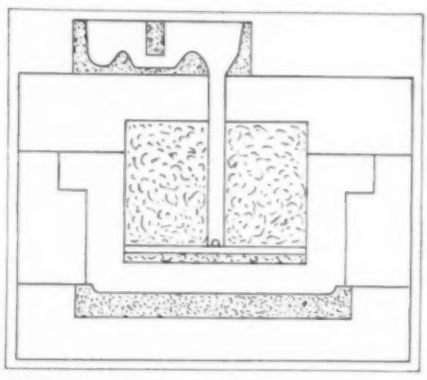
We shall appreciate list of firms manufacturing machines for making runner cups or pouring basins in multiple.

We do not know of any machine designed especially for making runner cups, single or in multiple. In steel foundries where the cups are used most extensively, they are made on small, plain, jolt ram machines, operated by hand or by power. When not engaged in making runner cups, the machines are diverted to other uses in making molds and cores. These machines are standard product of all molding machine manufacturers whose names and addresses appear in the advertising pages of THE FOUNDRY. If necessary or desirable, the manufacturer of the molding machine can furnish the pattern or the frame for making the cups.

Defects on Face of Mold Casting

We are forwarding a plunger for a glass house mold with an ornamental design on the face. We are also submitting a sketch showing the present method of attaching the gate and riser. The core print is molded in the drag, the remainder of the pattern is in the cheek and the cooler core is hung in the cope. The thin core which forms the ornamental face is faced with a mixture made up of a proprietary sand containing zircon 100 pounds, core oil 1 pint, another binder 2/3 pint and water 1/4 pint. The remainder of the core is a coarse core sand mixture. After the cores are dried they are sprayed lightly with a wash and re-heated to expel all moisture. Iron from the cupola is tapped into ladles previously warmed by hot iron and left to boil as long as possible. Experience shows that the castings must be poured with very hot iron. We have tried pouring them double, but without success so far as a prevalent type of defect is concerned. Small holes appear here and there on the face. Do you think any relationship exists between the time the sand is mixed and the cores are baked.

The core produces a beautifully smooth and clean face on the casting. You can dismiss it from the list of variables responsible for the small holes. These holes are caused by small particles of slag and in one or two instances by sand grains. Evidence of slag also appears on the upper face of the casting. Apparently this floated on top of the iron and was carried up and pressed against the cope. Presence of slag indicates a certain amount of laxity in skimming and pouring. Presence of occasional sand grains shows the result of erosion at some point in the gating system. By checking up on these two items and taking the proper remedial steps you should have no further trouble. Your present gate which introduces metal at the bottom has many commendable features and might be continued if you introduce a skim core or dirt catcher at some point between the pouring basin and the entrance to the mold. The riser is unnecessary and simply represents wasted metal.



Gate through core will prevent entrance of foreign materials into mold

Theoretically it is large enough and high enough, but the connection with the casting is so small that the metal freezes in it before it solidifies in either casting or riser. The accompanying sketch shows a gating system which prevents the entrance of any foreign material through the gates. Part of the central sprue is formed in the cooler core. Two ½-inch rods at right angles to each other pass through the lower end of the gate pin. They are pulled out before the corebox is removed from the core. The sprue in the cope forms a continuation of the sprue in the core. The pouring basin may be made up in green sand, but a dry sand basin made in the core room is preferable. Metal is poured in the depressed end of the basin to form a pool and then flows under a dam where any scum is caught, and then flows to the sprue.

Aluminum Casting Contains Holes

We are forwarding a section of an aluminum alloy casting which is 2 feet long and 18 inches wide, and gated at both ends on the longest dimension. You will note the defect which takes the form of a hole on the drag side, but it is not confined to that section or any particular place. Sometimes it only is the size of a pin head but extends so deeply that it cannot be polished out. The alloy is poured at 1275 degrees Fahr.

Examination of the specimen shows a hole about $\frac{3}{16}$-inch in diameter with a raised edge surrounded by a roughened and lighter colored ring. The hole contained some material which when dug out and inspected with a low power magnifying glass indicated that it was molding sand. To us that combination indicates the presence of *sand balls* resulting from improper sand conditioning. Whether the smaller holes which you mention as appearing from time to time are produced by the same cause is hard to say. Examine the surface of the castings carefully after cleaning, and see whether sand is imbedded in the surface.

Factors causing presence of sand balls include age of the heap, moisture control, and conditioning procedure. Water should be added in a spray fine enough to avoid washing the clay, and the moisture content should be maintained between 6 and 7 per cent.

Foundries speed work in core rooms with TRULINE BINDER

Reg. U. S. Pat. Off.

Every shift will turn out more cores with Truline Binder. Sometimes the output is doubled. Where Truline fits in, it will reduce core-costs, and give you smoother cores, too.

Truline-bonded cores bake so much faster that big cores will bake on one trip through conveyor ovens. And you save just as much time with smaller cores in regular ovens.

Another important saving is made on the cleaning floor. Truline burns out so quickly that the time for knock-out and cleaning is sometimes cut by as much as one half to two thirds.

All foundrymen want to increase production now. Probably you have increased your output and are doing your utmost to meet war demands. But if you have not investigated Truline Binder, you may be missing one opportunity to reach still greater volume.

You can find out about this easily without interrupting your present schedules. Just clip the coupon to your letterhead and mail it today.

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HERCULES POWDER COMPANY

INCORPORATED

907 MARKET STREET • WILMINGTON, DELAWARE

Please send ☐ sample ☐ information on how to use Truline Binder in casting: .....
(state type of work and kind of metal cast)

.....

Name _____

Company _____ *Title* _____

Address _____ *City* _____ *State* _____

33-56

men of industry

Thomas Kaveny Jr., vice president, Herman Pneumatic Machine Co., Pittsburgh, was elected president of the Foundry Equipment Manufacturers Association at its annual meeting held recently. Mr. Kaveny was born in Buffalo, and received his education at Duquesne University, Pittsburgh, Cornell University, Ithaca, N. Y., and the University of Pittsburgh. During summer vacations while in college, he worked for the Herman Pneumatic Machine Co., and upon graduation in 1927, joined the company as a special apprentice. In 1928 he was sent to Australia, and in 1929 he traveled throughout Great Britain and Europe on sales and agency work. In 1931 he was transferred from the manufacturing plant at Zelienople, Pa., to the company's general office in Pittsburgh, and was elected vice president July, 1933. Mr. Kaveny has been active for several years in the Foundry Equipment Manufacturers Association, serving on its board of directors since 1936, and as vice president since 1940.

♦ ♦ ♦

George Walton, formerly vice president and secretary, Madison Foundry Co., Cleveland, has been elected president succeeding the late Michael Merriman. Mr. Walton became connected with the Madison company 40 years ago, when not quite 15 years of age, and was trained in the foundry business under Mr. Merriman. In 1909 he was made secretary and several years later was appointed secretary and treasurer. In 1924 Mr. Merriman and Mr. Walton acquired full control of the Madison Foundry Co. and Mr. Merriman was made president and treasurer and Mr. Walton vice president and secretary. **W. T. Rossiter,** president and general manager, Cleveland Builders Supply Co., Cleveland, has been made vice president of the Madison Foundry Co.; **Mrs. Nellie M. Merriman** has been made treasurer, and **Charles Huletz,** who has been connected with that organization for approximately 25 years, was made secretary. **Thorpe J. McConville,** who also has been with the Madison organization for 25 years, was appointed foundry superintendent.

♦ ♦ ♦

John Howe Hall recently joined the General Steel Castings Corp., Eddystone, Pa., as metallurgist. Since 1937 Mr. Hall has maintained his own consulting metallurgical practice with headquarters in Philadelphia. Prior to that time, he was technical assistant to the president, Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

♦ ♦ ♦

Otto A. Seyferth, president of West Michigan Steel Foundry Co., Muskegon, Mich., has been appointed a member of the new five-man policy committee of the War Production Drive Headquarters. The committee will determine the policies of the War Production Drive Headquarters under which labor-management committees can best contribute to war production.

♦ ♦ ♦

John E. Hartigan, president, Vincennes Foundry & Machine Works, Vincennes, Ind., has been made president of the Knox County Welfare board.

♦ ♦ ♦

Weston W. Taylor formerly owner of the Taylor Foundry Co., Inc., Manitowoc, Wis., sold the foundry and now is employed at the Ordnance Steel Foundry, Bettendorf, Iowa.

♦ ♦ ♦

Col. Karl Landgrebe, for many years vice president, Tennessee Coal, Iron & Railroad Co., has been appointed vice president, Goslin-Birmingham Mfg. Co., Birmingham, Ala.

♦ ♦ ♦

J. H. Dougherty, assistant to the steel controller, Department of Munitions and Supply in Canada, who has been on loan from Canada Iron Foundries Ltd., has returned to his company at Montreal to assume the posts of vice president and director, to which he recently was promoted.

♦ ♦ ♦

William J. Priestly, vice president, Electro Metallurgical Co., New York, recently has been appointed chief, Alloy Steels Unit, Iron and Steel Branch, WPB.

(*Concluded on page* 92)

George Walton

Thomas Kaveny Jr.

John Howe Hall

Otto A. Seyferth

Woodward

Uniform PIG IRON

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

(*Concluded from page* 90)

Mr. Priestly succeeds **A. Oram Fulton,** who will aid in general steel distribution problems.

♦ ♦ ♦

C. F. Colburn recently has been appointed metallurgist, Lawrence Engineering & Research Corp., Linden, N. J. Mr. Colburn formerly was connected with Goulds Pumps Inc., Seneca Falls, N. Y., and prior to that time served as metallurgist, Sterling Foundry Co., Wellington, O. He is a graduate of Rutgers University, New Brunswick, N. J.

♦ ♦ ♦

Damon de B. Wack, assistant to the president, National Bearings Metal Corp., St. Louis, has been elected executive vice president in charge of all plants. Mr. Wack formerly was vice president of the Pacific Coast Division of the parent company, American Brake Shoe & Foundry Co. and he has been in St. Louis about a year.

♦ ♦ ♦

John L. Schmeller, formerly executive vice president, National Bronze & Aluminum Foundry Co., Cleveland, has been elected president of the company. Other officers of the company who were elected at the recent meeting of the board of directors, are: **W. F. Muth,** vice president and secretary; **George N. Wright,** vice president. **George N. Hilliard** is comptroller.

♦ ♦ ♦

Charles G. Maier has been appointed to the supervisory staff of Battelle Memorial Institute, Columbus, O. Mr. Maier will direct and correlate an enlarged program of fundamental research and will serve as advisor and consultant to the institute's war research for the government and industry. He formerly was connected with the U. S. Bureau of Mines for 20 years.

♦ ♦ ♦

George H. Tweney, instructor in aeronautical engineering, University of Detroit, Detroit, has been appointed acting director of the Department of Aeronautical Engineering in the absence of **Prof. George J. Higgins,** director of the department, who has been given leave of absence and is a lieutenant commander in the United States Navy. Mr Tweney will administer the work of the department until Prof. Higgins returns.

♦ ♦ ♦

Edward F. Vincent has been elected a director, LaSalle Builders Supply Ltd., Montreal, Que., to succeed the late J. S. T. Bethune. Mr. Vincent has been manager of the refractories department of the company and will continue in that office in addition to assuming new responsibilities. Before joining the LaSalle Builders Supply company, Mr. Vincent was connected with Canadian Fairbanks-Morse Co. Ltd. He is a member of the executive committee of the American Society of Metals.

♦ ♦ ♦

Harry W. Renick recently has been appointed a vice president Brake Shoe & Castings Division, American Brake Shoe & Foundry Co., New York. This is in addition to his present duties as vice president, Ramapo Ajax Division. Mr. Renick was born in Denver, and majored in civil engineering at Stanford University. After college he went to work for the Union Pacific and the Colorado and Southern railroads in engineering and construction work. In 1913 he became connected with the Elliot Frog & Switch Co., now a part of Ramapo Ajax, and 3 years later was sent to St. Louis as sales manager. In 1926, Mr. Renick was instrumental in opening Ramapo's first plant on the West Coast at Los Angeles, for the manufacture of railroad frogs, switches, and special trackwork. He was placed in charge of the plant and later of a new plant at Seattle as well. When Ramapo Ajax became a division of the American Brake Shoe & Foundry Co., Mr. Renick was made vice president in charge of the division's Western plants at Los Angeles, Seattle and Pueblo, Colo.

Harry W. Renick

♦ ♦ ♦

George B. Wadlow, for more than 25 years connected with the Continental Roll & Steel Foundry Co., East Chicago, Ind., in purchasing, production and sales capacities, has been appointed assistant to the president, Continental Ordnance Corp., a subsidiary of the Continental Foundry company. Mr. Wadlow has played an important part in the expansion program of the Continental Roll & Steel Foundry Co., which has greatly enlarged its facilities on account of major participation in war production.

To Reach Market in South America

Revista Industrial, a new monthly publication for Latin America to make its appearance early in 1943, will be published by the Equipment Digest Publishing Co., Cleveland, a subsidiary of the Penton Publishing Co.

The basic purpose of this publication will be to cover the latest industrial developments, equipment, processes, materials, methods and applications as well as the available industrial literature from manufacturers in the United States.

Two editions of *Revista Industrial* will be published, one in Portuguese for Brazil and one in Spanish for the other Latin American countries.

Revista Industrial will be addressed to firms engaged in mining, construction, public utilities, transportation, processing and manufacturing.

Editorial content and page style will follow that of *New Equipment Digest,* a tabloid size publication.

Bolton To Present A.F.A. Lecture

The technical lecture which recently was authorized by the board of awards of the American Foundrymen's Association upon recommendation of the board of directors, is to be known as the American Foundrymen's Association Foundation lecture. The first foundation lecture will be given at the St. Louis convention in April by John W. Bolton, director of metallurgical research, the Lunkenheimer Co., Cincinnati. The subject of Mr. Bolton's talk will be announced later.

Research Institute Holds Meeting

First war time meeting of the Meehanite Research Institute of America, Inc., was held in Pittsburgh on Nov. 5 and 6. Attended by over 100 representatitves of Meehanite Foundries from the United States and Canada, the meeting featured recent researches on a variety of subjects.

Officers elected for 1943 were as follows: President, Oliver Smalley, Meehanite Metal Corp., Pittsburgh; vice president, H. B. Hanely, American Laundry Machinery Co., Rochester, N. Y.; secretary-treasurer, A. M. Galbraith, Meehanite Metal Corp., Pittsburgh.

Plans for a continued sales promotional and advertising activity for 1943 were discussed and approved.

Federal Foundry & Supply Co., Cleveland is building a two-story factory, located in Charleston, W. Va.

Be sure to segregate your alloy scrap

Careful segregation and identification of alloy iron and steel scrap should be standard procedure in every plant collection program.

1. It helps conserve essential, scarce alloying elements.
2. It helps eliminate wasted time, material and effort in the steel mills.

Alloying elements such as cobalt, molybdenum, nickel and tungsten are readily recoverable from scrap. If their presence in a lot is known, the scrap can be used in making up a charge of alloy steel of the same or similar analysis. The amount of alloying elements that must be taken from stock is reduced.

But, if, through lack of segregation, alloy scrap gets into a charge where no alloys are wanted, such as a plain carbon steel, the alloying elements are utterly wasted. It is also possible that the heat itself will be lost because of failure to meet specifications.

The difficulties of scrap segregation increase with every handling. The source is the best point for segregation. Comparatively little time and trouble taken there will save a great deal of trouble and wasted time at the mill.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

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MOLY

A·F·A Will Hold Foundry War Production Congress in St. LOUIS

THE American Foundrymen's Association has announced that its forty-seventh annual meeting, which will be staged in St. Louis, April 28, 29, 30, 1943, will be a Mobilization of Management, Technical, and Operating Men for the purpose of devising ways and means for extending the use of cast metals in the war effort.

Guided by experience gained during World War I, when the A.F.A. staged five successful conventions, 1914 to 1918 inclusive, each with increasing interest and attendance, the board of directors planned in July, 1941 for staging a Foundry Congress and Exhibit in 1942 emphasizing the importance of the castings industry in defense work.

In November the plan was broadened to include staging of the first Western Hemisphere Foundry Congress as a step toward furthering the government's good neighbor policies, hemisphere solidarity and the further purpose of a united effort on the part of the foundry industries in all the Americas.

The murderous attack on Pearl Harbor Dec. 7 and the declaration of war with all axis powers changed the program to an all out effort of the foundry industry for increased production of war materials.

That congress staged in Cleveland last April was rated the most successful and most important ever staged by and for the foundry industry establishing an all time attendance record.

The second Global War Foundry Congress, which will be staged at St. Louis without commercial exhibits, will be another all out effort to strengthen and increase the foundry industry's contribution to complete victory.

Hotels Jefferson and Statler have been designated as joint headquarters for meetings with the registration headquarters of the convention located at Hotel Jefferson.

The 1943 convention is being held at the invitation of the St. Louis District Chapter of the A.F.A. and committees from that group will assist the national office in handling many of the details of the convention activities. The St. Louis Chapter was the fifth organized under the banner of the American Foundrymen's Association and has been very active in furthering the interests of the foundry industry in that district. Since its organization, it has staged three regional conferences, two at the Missouri School of Mines, Rollo, Mo., and one at St. Louis.

C. B. Shanley, Semi-Steel Castings Co., St. Louis, is chairman of the chapter, Luther A. Kleber, General Steel Castings Corp., Granite City, Ill., is vice chairman, and John H. Williamson, M. A. Bell Co., St. Louis, is secretary-treasurer. Directors include the following: Lloyd C. Farquhar, American Steel Foundries, East St. Louis, Ill.; Walter E. Illig, Banner Iron Works, St. Louis; A. O. Nilles, Griffin Wheel Co., North Kansas City, Kans.; Francis O'Hare, Central Brass & Aluminum Foundry, St. Louis; L. J. Desparois, Pickands, Mather & Co., St. Louis; E. A. Goerger, City Pattern & Model Co., St. Louis; H. Goodwin, Medart Co., St. Louis; Webb L. Kammerer, Midvale Mining & Mfg. Co., St. Louis; Fred B. Riggan, Key Co., East St. Louis, Ill.; George W. Mitsch, American Car & Foundry Co., St. Louis; James Roland, Fry-Fulton Lumber Co., St. Louis; Walter A. Zeis, Midwest Foundry & Supply Co., Edwardsville, Ill.

The CORE OIL DOCTOR

Devoted to new ideas and case study reports on core room practice

Published Monthly, Volume 1, Number 9, December, 1942

Merry Christmas *Happy New Year*

BUY
WAR
SAVINGS
★ BONDS ★

To our many friends in every State of the Union, who have contributed so much to our success, "We thank you sincerely;" and our heartiest wish is that Christmas, the most glorious of all festive seasons, will be a happy one for all with the New Year exceeding your fondest expectations. Those who accept the privileges of our country in peace should feel honored to defend it in time of war, whether it be on the production line or the actual fighting front. If we, back home, will do our job well and give our best, then just so much quicker can our fighting forces complete their job of winning the war — and help to win the peace to follow.

Buy yourself a real Christmas gift!

All foundry men can add greatly to their knowledge of core room practices by purchasing a copy of the new book, "Modern Core Practices and Theories" recently published by the American Foundrymen's Association, 222 W. Adams St., Chicago. This 500-page hard-bound book is really a dictionary of core practices, methods and procedures and we strongly recommend every foundry to secure at least one copy.

CERTIFIED CORE OIL & MFG. CO.

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Stock and Representatives: Buffalo, N. Y. Elmira, N. Y. Worcester, Mass. Reading, Pa. Newark, N. J. St. Louis, Mo. New Orleans, La. Houston, Tex. Chattanooga, Tenn. Minneapolis, Minn.

among Detroit foundries

BY A. H. ALLEN
Detroit Editor, The Foundry

NEWS that Ford had started final assembly of M-4 medium tanks at the old Highland Park plant was no surprise to industry in Detroit. For some time, work has been in process on a tank test track near the plant, and some tanks have been seen circling the proving grounds. But the first official word that production had started came Nov. 10.

The 32-ton tank is virtually a duplicate of the design now in production at the Chrysler tank arsenal and at the Fisher Body tank plant. However, it has a number of innovations in construction which were worked out by Ford engineers. One is the improved accessibility of interior equipment, permitting quicker and easier servicing of the engine and other mechanisms. Also, the mounting for the 75-millimeter main cannon has been simplified by substituting three castings for the 27 separate pieces formerly required for fabrication of the gun mount.

Much of the heavy armor plate for the Ford tank is produced right at the Rouge plant, and the new steel foundry there is supplying a wide range of castings for use in the tank. The foundry is stepping up operations gradually and when peak production is attained, it will be turning out an enormous tonnage of material. Ford is using the triplex melting process—cupola, converter and electric furnace in the new plant, and is now pushing the acquisition of low-phosphorus scrap for use in the plant. Supplies of this type of scrap in the Detroit area are scanty, suggesting that melters may have to use material with higher phosphorus and resort to dephosphorizing in processing.

Another new installation for triplex melting of steel for casting is that of the Detroit Gray Iron Foundry Co. This company has four cupolas and two electric furnaces—a 1000-pound and 3-ton—which will be combined with two 3-ton bessemer converters in the new melting setup. At present this project is still in the construction stages but by the first of the year it should be operating smoothly.

Detroit Gray Iron continues in production of a wide assortment of heavy gray iron castings principally for various types of machines and equipment to tool aircraft and ordnance plants. A recent contract called for shipment of a number of 12 to 15-ton castings to an Illinois ordnance plant. The Detroit company has been a leading producer of stamping dies for the automobile industry. In the steel field, a number of miscellaneous types of castings for tanks, guns and other ordnance are being supplied.

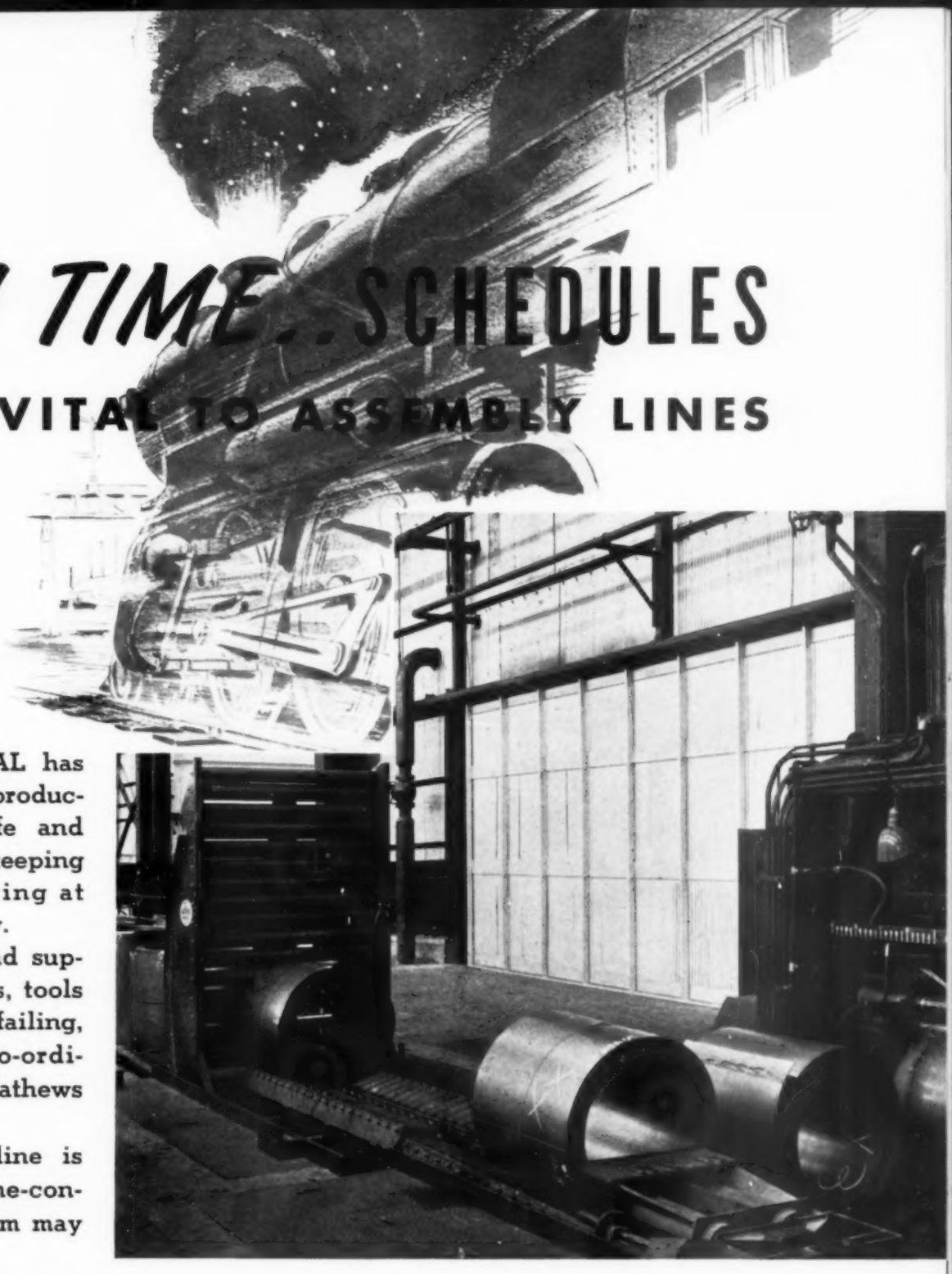
There are now three principal suppliers of the M-4 medium tank in this district, and in recent weeks the production picture has been quite confused. The Chrysler arsenal has been expanded roughly 25 per cent beyond its original size and the entire Chrysler tank production program realigned to convert the arsenal into primarily an assembly plant, with production of parts and subassemblies farmed out to the various Chrysler divisions throughout the middle west. Incident to this realignment and to the change from rubber to steel for treads, a temporary lull in final assemblies has resulted. Also a factor was the curtailing of ordnance production generally in favor of concentration on aircraft, step which has had wide repercussions in all plants producing for ordnance.

Reportedly there has been no final decision as to just what metal will be used in tank treads, just as there has been no choice of a standard power plant for the M-4 tank. Shortage of machining facilities is a further complicating factor in the supply of steel treads, each tank requiring 360 separate pieces, together with the necessary pins and linkages. Castings, forgings and specially formed rolled sections have been suggested for use in treads; all have their advantages and disadvantages.

In the field of tank engines, there is the 450-horsepower Wright-type radial engine, which has gone into most of the medium tanks thus far built; the twin-six General Motors diesel, now in quantity production and presumably being installed in tanks built by Fisher; the Ford 8-cylinder liquid-cooled engine, adapted for tank use from the design of the 12-cylinder Ford aircraft engine; and the Chrysler arrangement of five 6-cylinder automotive-type engines. So far, the Ordnance Department, through its new Tank and Automotive Center recently established in Detroit, has been

(*Concluded on page 99*)

First picture released of assembly line on which 32-ton M-4 medium tanks are being built by Ford Motor Co., Detroit. Ford engineers have pioneered a number of innovations in design and construction



ON TIME.. SCHEDULES

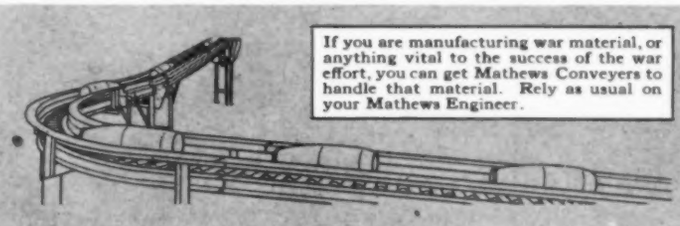
ARE VITAL TO ASSEMBLY LINES

● **TARDY MATERIAL** has no place in war-time production schedules . . . life and liberty depend on keeping assembly lines moving at split-second efficiency.

Moving material and supplies to waiting hands, tools and machines at unfailing, on-time, perfectly co-ordinated schedules is a Mathews Conveyer job.

If your assembly line is lagging, a Mathews time-controlled conveyer system may solve your problem.

MATHEWS CONVEYERS FOR MECHANIZED PRODUCTION



If you are manufacturing war material, or anything vital to the success of the war effort, you can get Mathews Conveyers to handle that material. Rely as usual on your Mathews Engineer.

MATHEWS CONVEYER COMPANY

ELLWOOD CITY, PENNSYLVANIA

Alloy steels for planes, and planes for victory—that is one of the formulas in which Molybdenum, Tungsten, and Boron are of major importance. Whether planes or ships, tanks or guns, are looked to for success in the war, superior steels are required and alloying elements are indispensable. Minutely weighed, measured out, and apportioned for use, such materials might well be the subject of daily headlines. If everybody were a metallurgist, every new increment of supply, every new drain on existing reserves, might be bulletined like the rise and fall of battle, and everybody would be on tiptoe for the latest word.

On the current availability and most approved uses of Molybdenum, Tungsten, and Boron, correspondence will be welcomed by the Molybdenum Corporation.

AMERICAN Production, American Distribution, American Control—Completely Integrated.

Offices: Pittsburgh, New York, Chicago, Detroit, Los Angeles, San Francisco, Seattle.

Sales Representatives: Edgar L. Fink, Detroit; H. C. Donaldson & Co., Los Angeles, San Francisco, Seattle.

MOLYBDENUM **CORPORATION OF AMERICA**
GRANT BUILDING PITTSBURGH, PA.

MCA

(*Concluded from page 96*)

glad to take all the engines of every type it could get. Ultimately, it is believed, there will be standardization on some one or two types of power plant, to simplify problems of field supply and servicing.

The Dodge foundry is turning out several castings for the tank engine which Chrysler engineers have designed, the most interesting of which is the center crankcase section. The molding and coring of this casting were intricate jobs, since the casting has a number of faces disposed radially about the central vertical axis, to which the cylinder blocks of the five component power units are bolted. Some of the sections of the crankcase are quite thin, and the problem of setting cores accurately so that a sound casting can be obtained was not readily solved.

Studies have been directed toward the use of more gray iron in tank construction, in view of the intensive pressure on steel castings. Thus, there appears no good reason why a gray iron, of say 250 brinell hardness, would not be suitable for bogie wheels in tanks to replace steel. Each of these wheels weighs about 45 pounds and there are a dozen or so on each tank. Engine flywheels of gray iron instead of steel might be considered another worthwhile conservation measure.

Set Up Regional Office

All these problems of design and substitution of materials in tanks are being given active consideration by the previously mentioned Tank and Automotive Center of the Ordnance Department, recently moved into the 40-story Union Guardian Building, Detroit. Headed by Brig. Gen. A. R. Glancy, deputy chief of ordnance, with Brig. Gen. Donald Armstrong, chief of the center, and Brig. Gen. John K. Christmas, assistant chief, the center is likened to a vertical slice of the Ordnance Department which has been moved to Detroit to be in closer proximity to the manufacturers of tanks and automotive military requirements. Establishment of the center was in line with the decentralization policy of Maj. Gen. Levin H. Campbell Jr., chief of ordnance. It is emphasized that the Tank and Automotive group is entirely separate from the Detroit Ordnance District office, which is a regional office only.

It may be of interest to note how procurement of tanks now is set up. The chiefs of staff of the United Nations decide, for example, that Great Britain will produce 10,000 medium tanks and the United States a like number by such and such a date. The chief of staff of the Army gives the order to the Services of Supply, headed by General Somervell, who in turn transfers the order to the Chief of Ordnance. He then gives the order to the Tank and Automotive center, which is the office of chief of ordnance so far as tanks are concerned. The center then assigns portions of the job to one ordnance district, and portions to another, or possibly all 13. Thus the center deals directly with the ordnance districts and not with the manufacturers involved.

Of the ten billions of dollars worth of ordnance contracts processed through the 13 districts, almost half is for equipment in the tank-automotive classification, and will be directed by the new center in Detroit. It will eventually have a staff of approximately 2500, many of whom already have been transferred from the East, St. Louis and elsewhere.

Plan Further Expansion

It is understood the new Buick aluminum foundry, see page 66 of this issue, now in production on aircraft engine cylinder heads, is contemplating further expansion of production which may require installation of additional melting furnaces in which to alloy virgin aluminum. So great are the requirements of the plant for ingot that the supplier reportedly is unable to furnish them. Hence it has been proposed that the plant buy a so-called "double-rich alloy and then "thin" it out to suitable composition for the casting operations. Present melting furnaces handle only the return scrap. New equipment would be needed for processing the virgin metal which is approximately 65 per cent of the mix supplied to production melting crucibles.

Dodge is setting up a small aluminum foundry on the top floor of its foundry building at the Dodge main plant. Considerable new equipment—conveyor lines, shakeouts, molding machines, melting furnaces and the like—is being installed to handle castings production on a continuous basis. A variety of small parts will be made, for use in the fuselage sections of the Martin B-26 bomber, built by Chrysler at another plant.

Issues Manual

Metallizing Co. of America, Chicago, has issued a 64-page manual describing procedures in spraying metal coatings on various materials. The manual is divided into sections describing preparation of the surface, applying the coating, finishing, protective appliances, corrosion, machine element coatings, machining, etc. Price of the manual is $2.

B. F. Sturtevant Co., Hyde Park, Boston, Mass., has opened a branch plant at LaSalle, Ill. J. F. Gibson is superintendent and F. Herlan is general manager of the Midwestern division.

Book Review

Structure and Properties of Alloys, by R. M. Brick, instructor in metallurgy, and Arthur Phillips, professor of metallurgy, Yale University; fabricoid; 227 pages 6 x 9 inches; published by McGraw-Hill Book Co., New York; price $2.50.

Purpose of the book is to establish the correlation among alloy phase diagrams, microstructures and properties. Special attention has been directed to the effect of industrial practices in casting, working and heat treating alloys on the application of or departure from theoretical principles. One hundred thirty six micrographs with full description of their origin illustrate normal and abnormal structures of most standard alloys. The book will be valuable not only for defense training courses given to industrial employes, but for general engineering students who will use metals and should understand the basis for compositions, heat treatments, structures and properties.

Anniversary Book

Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has published a 53-page booklet commemorating its two hundredth anniversary. The booklet presents a history of the organization, as well as illustrations of the early plants of the company. In conclusion the booklet shows Taylor-Wharton's part in the national war effort, in addition to its modern peacetime products.

Tons of iron borings and steel turnings, by-products in the manufacture of war materiel at the East Springfield, Mass., works of Westinghouse Electric & Mfg. Co., are returned to the production line in the form of 2-pound circular bricks that roll off a newly installed briquetting press at the rate of 1000 per hour. Photo courtesy Westinghouse Electric & Mfg. Co.

DELIVERIES INCREASED TO

SLY CLEANING

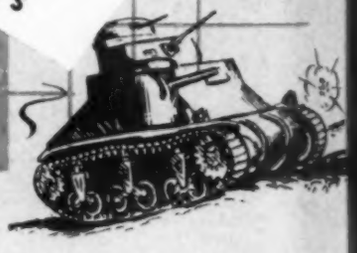
★ Blast Rooms, Blast Cabinets, Blast Mills, Centri-Blast Airless Cleaning Equipment, Tumbling Mills, and Dust Filters.

Over two generations' specialization in supplying the exact equipment for the particular work—in helping set new production records through *better, faster, lower cost cleaning.*

Only in Sly Equipment can you experience Sly exclusive features of superiority. Blast Rooms, for example, unmatched in durability—doors and walls of double construction on rigid angle iron frames. Much greater safety of operation due to floors of grating and perforated plates. Unequalled ventilation and lighting.

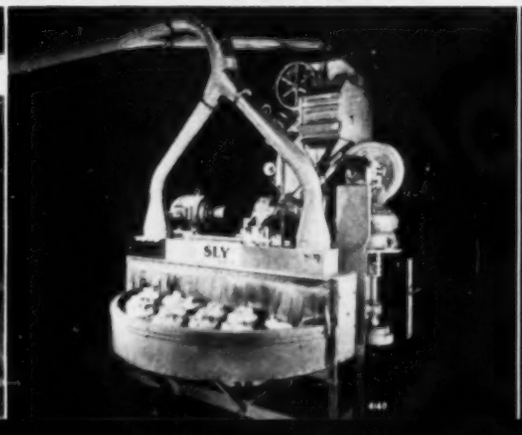
DISCRIMINATING BUYERS CHOOSE

1940

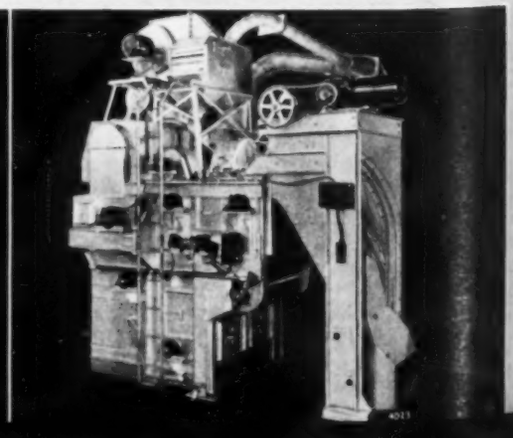


SLY BLAST ROOM

SLY CENTRI-BLAST TABLE



SLY CENTRI-BLAST MILL



6 TIMES THOSE OF 3 YEARS AGO

1942

ROOM EQUIPMENT

MORE AND MORE SLY EQUIPMENT

★ The recognition of such advantages in Sly Equipment has been responsible for exceptionally large purchases:

A total of 52 Sly Blast Rooms for three manufacturers
A total of 98 Sly Dust Filters on a single order
A total of 240 Sly Blast Cabinets for a single manufacturer

1941

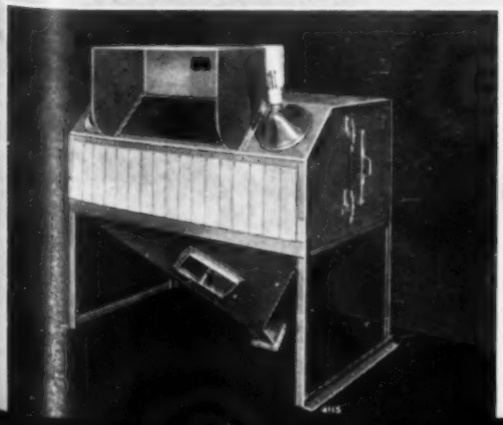
These are only three out of numerous examples of the preference for dependable Sly Equipment. And it is being constantly improved . . . new units perfected, such as, the Sly Centri-Blast Table—the most modern piece of Airless Blast Cleaning Equipment on the market today.

The production methods of years gone by are not adequate for today's needs. We are thinking in terms of tomorrow's requirements —in terms of improved equipment. Product study and research are bringing results. New and better methods are on the way.

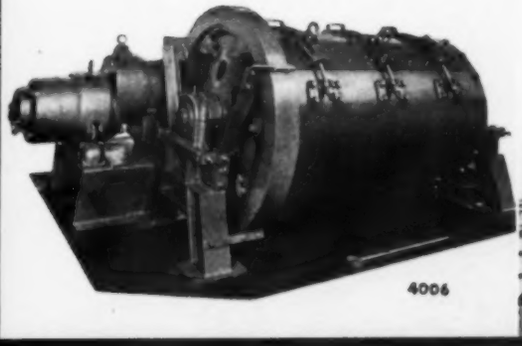
THE W. W. SLY MFG. CO.

4753 TRAIN AVENUE CLEVELAND, OHIO

SLY BLAST CABINET



SLY TUMBLING MILL



SLY DUST FILTER

the adventures of Bill

IT APPEARS to me," said Bill the other night, "that our modern educational system, or method of living, or the radio, or maybe a combination of all three, is developing children's minds too fast for their own good, or for the peace and comfort of their ever loving parents. Now when I was a young gossoon I knew practically nothing—"

"Oh," I said, "You are too modest. Why set a limit to the period?"

"Calmly ignoring this underhand, base, totally unwarranted and cowardly insinuation, our hero never batted an eye, or whatever it is that heroes do under like circumstances. By the way—and perhaps this lends some point to your otherwise dull shaft of so called wit—how does one bat an eye? I thought so. You know no more about it than I do, or ever did and that leaves us even all around and in the same little boat.

"As I was saying when I was running around on my own pair of little bare feet, dressed economically, but comfortably in a little short cotton shirt and a little short pair of ragged pants held in place by one suspender, I heard and read many items I did not understand. Did I ponder on these things day and night? Did I analyze them, take them apart and then try to put 'em together again in a manner to bring them within my limited comprehension? Not I. They went in one eye or one ear, as the case might be, and out through my elbow and left not a single trace on the shining surface of my vacant little mind."

"All very interesting. So you were a dumb little bunny. So what?"

"I may have been a dumb little bunny, but I was not a pest, a thorn in the side of parents, teachers and chance visitors to the old homestead. I was not an animated question mark pestering one and all for answers to impossible questions. The other day a cute little cherub about a year or maybe a year and a half past the wooly lamb stage put me on the spot. 'Gramp', says she as serious as a young owl, 'Old Pickle Puss wants an essay tomorrow, 1000 words if you please, on the fascinating subject of what is the difference between a theory and a hypothesis.'

"Looking back to my own school days, I was somewhat startled to find that although we did not refer to the dear teacher as Pickle Puss, we had other names which more or less indicated a mark hovering close to zero on the love, affection and general esteem scale.

"Naturally I could not admit this to the cherub. Discipline must be maintained. I regret to admit that my few well chosen remarks on the subject did not produce the desired effect.

"'Just a lot of baloney,' says this dear little cherub, 'and furthermore,' she says, 'you can tell it to the Marines. I betcha,' she says, 'when you were a kid you had some elegant stingaree names for the teacher. I wish,' she says in her best coaxing manner, 'you would tell me a few of 'em. I am getting tired of Pickle Puss, and besides all the other kids use the term and I should like to have one or two or maybe three good pet names fairly dripping with vitriol, vinegar, venom, virulence, vodka and general vindictiveness.'"

"Undoubtedly," I interrupted at this point, "the temptation was strong, but I trust you exercised sufficient restraint to prevent you from contributing any items from the extensive foundry vocabulary. Blistering nick names applied freely and at random by skilled and unskilled workmen to other men elevated to positions of temporary or full authority, and whose actions and general deportment do not warrant whole hearted esteem and co-operation.

She loves to repeat the name

"However, we are getting too far away from the point at issue. Did you, or did you not, contribute a share to the little lady's essay on the difference between a theory and a hypothesis?"

"Who, me?" Bill exclaimed in astonishment." 'Pon my word, if my entrance to the Happy Hunting Grounds depended on my ability to spell the two words in the title of the blinkin' essay, I am afraid I would be thrown into the discard with the remainder of the mob who fail to make the grade. As to the subject itself, to my simple mind the two words have the same meaning. Suppose you throw a pot of metal into a mold and when you shake out the casting you find that the metal coyly has refused to fill all parts of the mold completely. Your immediate theory, based of course on experience, is that the metal was not hot enough, and therefore not sufficiently fluid. Another man under similar conditions sets up a hypothesis that the metal was not hot enough, etc. And so what have you got? A supposition."

"Well," I admitted cautiously, "while I am willing to agree with you in a general way, it might be a good idea to see what the late Mr. Webster has to say on the subject."

"You mean the dictionary fella? I bet he has plenty to say!"

"Indeed he has. Listen: In scientific usage a hypothesis is a provisional conjecture regarding the causes or relations of certain phenomena. A theory is a hypothesis which has undergone verification and which is applicable to a large number of related phenomena. In ordinary usage hypothesis may denote any assumption without proof. Theory is opposed to practice and sometimes to fact.

"I hope that clears up the situation and places you in position to help the little lady when and if she again seeks your co-operation."

"If she bothers me again I'll tell her to look in the dictionary. I wish I had known in time that the old boy had spread himself in such a liberal manner. Still an' all, as my old uncle Malachi used to say, my opinion on the meaning of the two words is still the same. That

(*Continued on page* 104)

OVERHEAD HANDLING
Solves Your MANPOWER *Problem!*

UNLOADS 21 TONS IN 30 MINUTES

SPECIAL CRANE SAVED $600 PER YEAR

HANDLING COSTS CUT 64%

SAVED 32 MANHOURS IN CUPOLA CHARGE DELIVERY

2 MEN UNLOAD CAR IN 1½ HOURS

ONE-MAN CONTROL OF STOCK DELIVERY

STORAGE INCREASED 50%

PRODUCTION INCREASED FROM 26 TO 48 TONS PER DAY

★ Long before the war, American MonoRail equipment was solving manpower problems. Today, the job has been multiplied many times but American MonoRail equipment is meeting it with significant regularity.

American MonoRail equipment enables one man to do the work of many. It reduces fatigue caused by lifting and carrying. It reduces accidents. It keeps production on scheduled routes without delays and results in savings in time and money.

To achieve volume production at minimum costs with maximum speed, it will pay you to call in an American MonoRail Engineer. Let him show you how American MonoRail will solve your manpower problems and bring you increased production.

THE AMERICAN MONORAIL CO.

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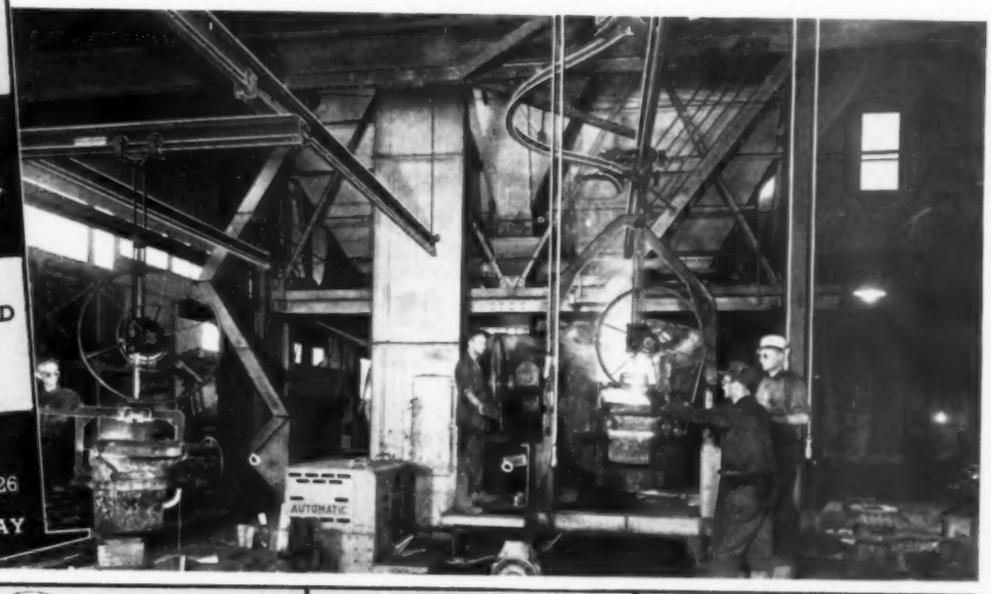


(*Continued from page* 102)

fanfare you just blew on the bugle reminds me of a highly popular song that flourished for a brief period several years ago, 'You press the middle valve down. The music goes round and round, o-ho-o, and comes out here!'

"They say misery loves company. General observation over a long and more or less up and down life indicates the same is true of ignorance. 'Tis a great consolation to me to find so many people who have only a bowing acquaintance or even less with the mother tongue in which they were born. When an ordinary run of mine citizen aims a word at the side pocket and lands in the corner pocket, no person is astonished or feels a burning desire to offer advice or correction. On the other hand, the reader has a legitimate grouch when a newspaper reporter handles words in a manner that indicates he is not familiar with the tools of his trade. A recent case in point is the number of hoopla scrap collection articles in which we are told over and over again that all the iron and steel scrap, and in some instances all scrap, is needed for the hungry blast furnaces, where the blast furnace men, brawny steel puddlers are waiting to turn it into tanks, guns and ships.. Has nobody ever told these birds that a blast furnace is not a steel furnace, and that steel is not puddled? Well, I suppose it takes all kinds to make a world. Listen to this gem which blew in with the postal tide recently:

We have been requested by the local salvage committee to melt the tin cans they have collected and pour the metal into pigs for shipment. Personally—we have no assurance on this point—the tops and bottoms are cut off and the cans are pressed flat in accordance with the usual instructions and procedure. In our school we have a small cupola lined to 21 inches in which for melting ordinary gray cast iron, the bed is 36 inches above the tuyeres, each iron charge is 300 pounds and each coke split 40 pounds. Naturally we have been reluctant about accepting the tin cans and doubtful of the results. If the idea is at all practicable will we have to change our regular cupola operation to any gerat extent?

"Here," said Bill, "plainly was a case where all stout hearted lads were in duty bound to rally around to the support of the party, said party without a doubt being in the dog house, or to put it another way, definitely on the spot."

"I move an amendment," I said, "that the last two words be changed to read 'the hot spot.'"

"Amendment carried unanimously and with three rousing cheers. In view of these crucial conditions I took time out and sent him the following letter:

Your local salvage committee without a doubt is strong on good intentions and is actuated by the highest and purest patriotic motive, but—at least so far as foundry practice is concerned—apparently is not quite up to the passing mark on practical knowledge. As with many amateur ideas that are fine and wonderful in theory, but sadly disappointing when and if tried out in actual practice, tin cans *can* be melted in the cupola, but unless the charge also contains some pig iron or cast scrap, the resulting metal will hardly amount to 25 per cent of the weight of the charged material.

In the cupola this material shrinks faster than a strip of bacon in a hot pan, or a snowball in a certain place where pyrometer records are not available, but suspected to be—shall we say—quite high.

Also the resulting metal will be fit for nothing except as part of the charge in an open hearth or electric steel melting furnace. For this purpose the cans in baled form are as acceptable as they would be after being melted and cast into pigs. Why burn up two thirds? Why go to the trouble and expense of melting the stuff twice? And more particularly why destroy the tin when this metal is needed so urgently? Every person knows, or should know that one of the reasons, in fact practically the only reason for salvaging tin cans is to recover the comparatively precious metal with which the cans are coated.

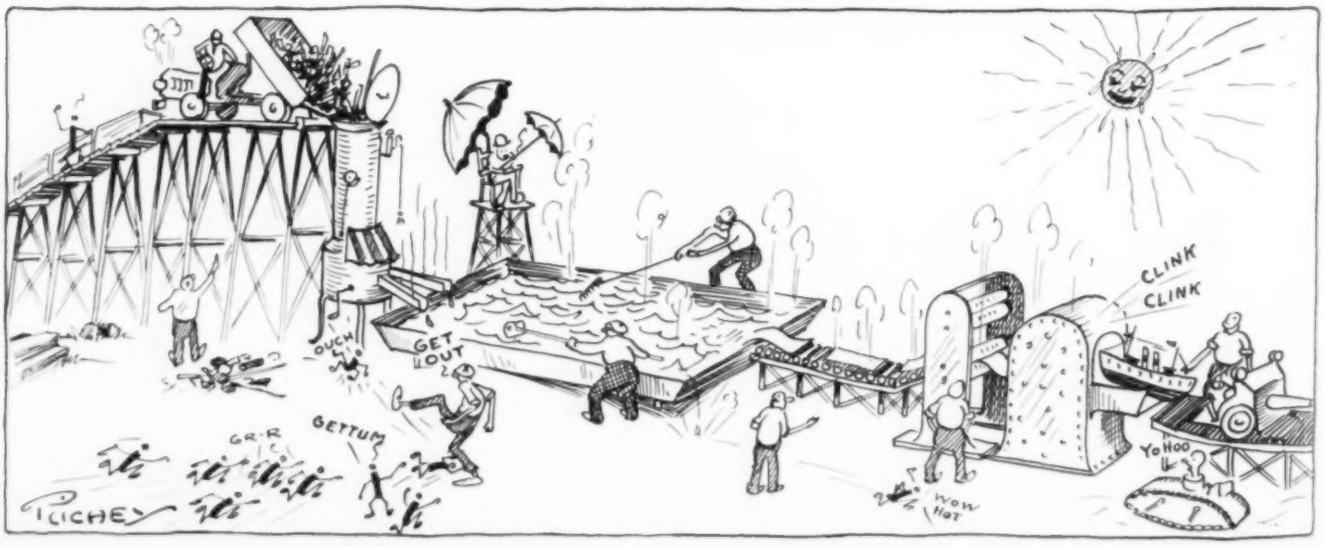
In the regular and proper routine the cans are detinned by a chemical process before they arrive at their ultimate destination in a steel furnace. Tin cans, as of course you are aware, are made from thin steel sheet and covered with an exceedingly thin layer of tin, about 25 pounds of tin per ton of steel. At 60 cents per pound 25 pounds of tin valued at $15.00 is approximately equal in price to the ton of steel scrap. In the cupola a negligible amount of the tin will melt and unite with the molten metal in the well, but almost the entire amount will oxidize and disappear through the top of the stack. Good bye. Gone with the wind.

Since tin melts at a temperature of approximately 450 degrees Fahr., it should be readily apparent that it has not much chance to hold its shape in a cupola where the temperature at the melting zone is over 3000 degrees. Perhaps a homely and somewhat exaggerated comparison will serve to illustrate. Ice melts at 32 degrees above zero on the Fahrenhite scale and becomes liquid water. The water is converted into vapor or steam at 212 degrees. If you—just for the sake of the argument—and not to put too fine a point on it—if you threw a hunk of ice into a cupola while in blast, would you expect any water to reach the bottom? You would in a pig's right eye. Neither would I.

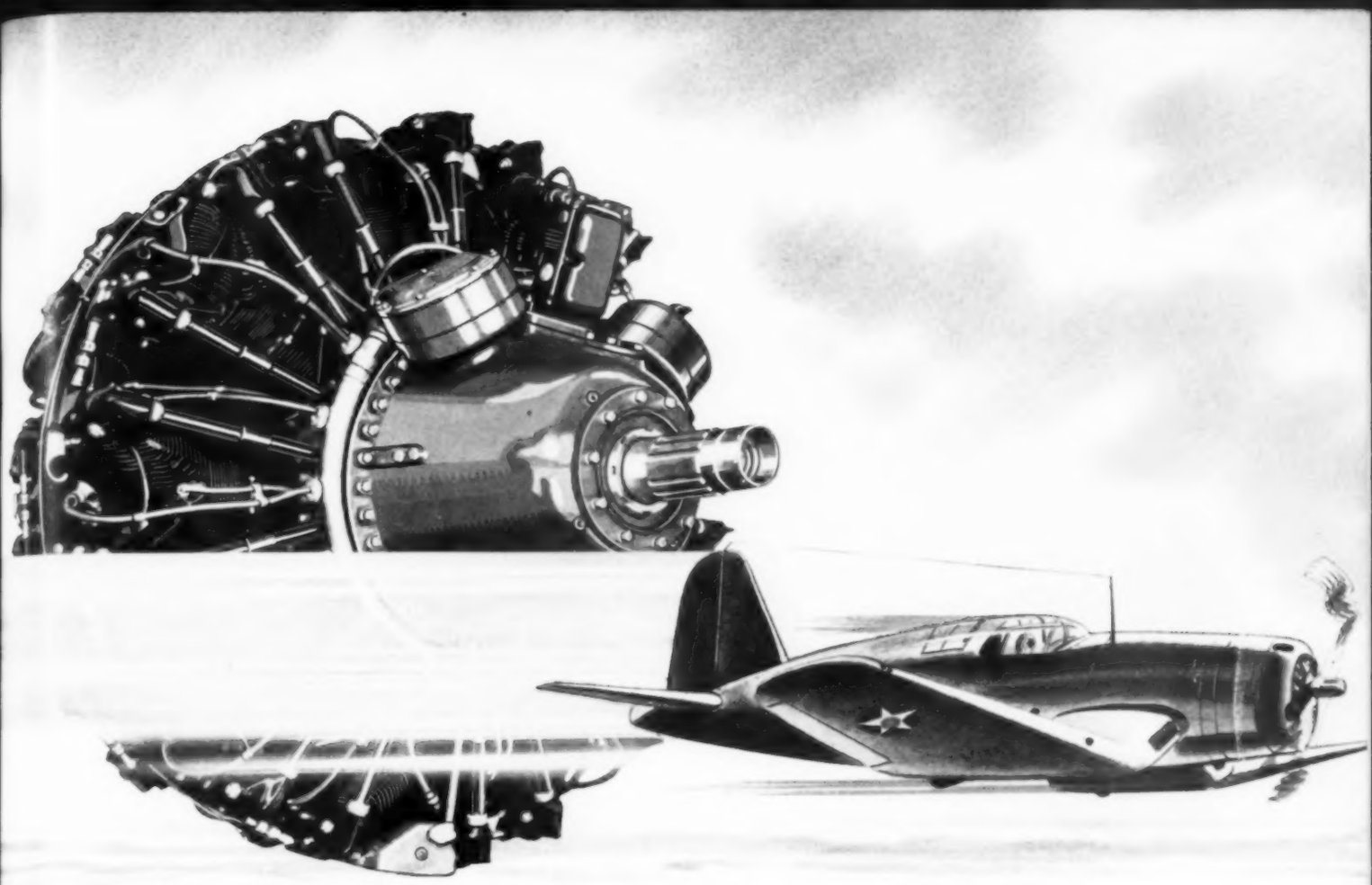
So far as actual melting is concerned, unless you have had extended experience melting complete or almost complete charges of light steel scrap in the cupola, you will have more than your share of trouble in trying to melt a heat of tin cans. You may consider yourself lucky if you succeed in getting the metal to run out through the tap hole.

Members of your committee may be highly estimable citizens who never shook their mothers or beat up their tender young children with a hickory gad, a

(*Concluded on page* 107)



Scene from modern American steel plant where scrap is converted into ships and tanks in three easy jumps



OSBORN BARBS THE *Wasp's* 18 STINGERS

THE fighting Pratt & Whitney DOUBLE WASP packs its tremendous power in two banks of 18 cylinders, each of which is serrated with dozens of cooling fins cast integrally with the aluminum cylinder head.

Since power output depends in large part upon the cooling efficiency of these fins they are made deep and thin, so they can be closely spaced (about 5 to the inch) and give maximum cooling surface.

The successful moulding of such precisely designed parts demands the highest type of precision in a moulding machine, for the slightest variation in drawing the pattern will distort or damage the thin walls of sand between the fins. But the need for mass production of these powerful engines means this delicate operation must be performed with precision and continuity.

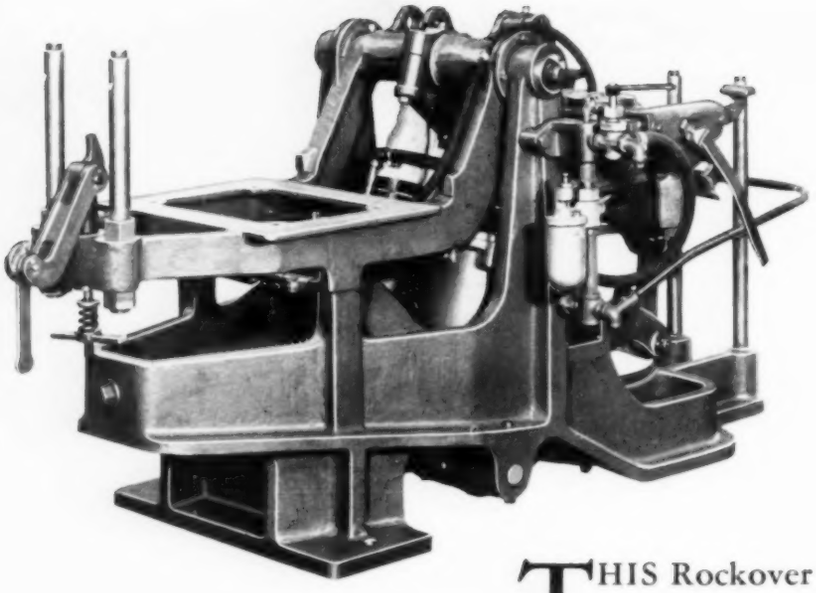
Precision and Production—that's the combination of factors responsible for today's huge volume of fine, accurate cylinder heads for Pratt & Whitney engines. Shown on the next page is the Osborn No. 2042, one of the high-quality, high performance Osborn Machines on which those cylinder heads are moulded.

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue • *Cleveland, Ohio*

OSBORN

MOULDING MACHINES



PRECISION *and* PRODUCTION

THIS Rockover and Draw Moulding Machine, No. 2042, with a fully enclosed draw mechanism working in an oil bath, was designed and precision-built by Osborn especially for high-volume production of Pratt & Whitney aircraft engine cylinder heads.

Batteries of these Osborn machines are in operation at foundries in several sections of the country turning out moulds for the tens of thousands of high-quality, accurate cylinder heads required by our vast aircraft program.

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue · *Cleveland, Ohio*

OSBORN

MOULDING MACHINES

(*Concluded from page* 104)

poker or a baseball bat. They may know all about beating the drum, organizing campaigns for any or all conceivable purposes. They may be expert practitioners in various walks of life, but alas, their combined knowledge does not include familiarity with what goes on inside that tricky piece of apparatus known to the rude and uncultured boys in the foundry as a kewbelow.

Don't let 'em bluff you, ol' kid. Stand up bravely. Politely and firmly say NO when they come around pestering you. Tell 'em to ship the stuff on the hoof as at present and as every other salvage group is doing all over the country.

Cast Armor Foundry Is Opened

American Steel Foundries officially opened its immense new steel foundry in East Chicago, Ind., on Oct. 29 with brief ceremonies formally initiating production of cast armor for tanks. Brig. Gen. Donald Armstrong, chief, Detroit Tank Automotive Center, and Thomas Drever, president, American Steel Foundries, presented addresses at the ceremony. Ground for the foundry was broken first on March 3, and when the official opening was held, the 30-acre structure was virtually complete with some interior work remaining to be finished.

More than 22,000 tons of steel were used in construction of the foundry; there are some five miles of railway track, three and a half miles of roadway, six open hearth furnaces and 41 especially designed heat treating furnaces. The cost of plant and equipment was around $26,500,000, with about half of that figure going for especially constructed production equipment. Financing of the project was by the Defense Plant Corporation, a government agency. American Steel Foundries acted as agent of the corporation in the construction of the plant and, as the lessee, is providing the management, technicians and workers and assumes full production responsibilities.

The cast armor being produced at the plant is highly resistant to projectiles and is a special type developed by the research division of American Steel Foundries.

Actually the foundry is two plants in one, for with the exception of the open hearth furnace all other facilities are duplicated in each half of the giant structure. The two-plants-in-one arrangement was decided upon to avoid loss of time in transporting materials over the long distances within the structure. Some 40 per cent of the workers will be women. The company is carrying on an intensive training program, with many trainees learning by working side by side with skilled workers.

These illustrations show a group of the industrial leaders present at the opening of the cast armor plant, American Steel Foundries, East Chicago, Ind., and a section of the new foundry

Society Issues New Specifications

Through action of Committee E-10 on standards, which committee in the interval between meetings can act for the society and which must approve all emergency standards, the American Society for Testing Materials recently has issued some 32 new standard specifications and test methods. Of those, 13 are emergency specifications and tests designed to expedite procurement or conservation of critical or strategic materials.

One emergency specification pertains to malleable iron flanges and valve parts and carries the designation ES-20. Processes of manufacture are covered; tests are to be in accordance with materials specifications listed for cupola malleable iron (A-195) or for malleable iron castings (A-197), and final marking requirements are given. The standard resulted from prompt work of Committee E-7 acting on a suggestion from the Conservation Division, WPB, that standardized requirements for those fittings would aid the substitution of malleable iron for copper in some valve parts, also substitution of iron valves for brass valves 2 inches or smaller. Shifting of material has been urged to conserve copper.

One of the new tests includes a new recommended practice for making torsion tests of cast iron (A-260) which covers the use of that method in connection with applications for crankshafts, couplings and similar service. From the torsion test result, values for other, important properties can be computed.

Foundry Developments at short range

AS A RESULT of continued research considerable progress has been made in the development of so-called fire retarding paints. Those coatings limit fire damage to wood over which they are applied, and thus help to retard the spread of a fire. Generally such paints are not suitable for exterior exposure, nor do they meet exacting appearance requirements. Consequently, their field of usefulness is confined chiefly to weather protected areas where looks are not a primary consideration. However, they do offer reasonable protection against extensive damage from small fires and also may help to prevent such fires from developing quickly to uncontrollable proportions. Formulas for fire retarding paints include one composed of 1 gallon of outside white or exterior primer, 11 pounds of borax, 3 pints of boiled linseed oil and 1 pint of turpentine. Another is made of 25 pounds paste white lead, 17 pounds of borax, 1¼ gallons of raw linseed oil, 1½ pints of turpentine, and ½-pint of liquid drier. The first formula makes 2¼ gallons of paint, and the second 3½ gallons.

* * *

Photographic reproduction of full scale drawings through use of a giant camera is being employed by the Glenn L. Martin Co., Baltimore, Md., to save around 750,000 man-hours of work in a year. The camera can reproduce in four minutes drawings up to 5 x 10 feet directly on nearly any kind of surface such as metal, wood, cloth, paper or glass which is coated with a special emulsion. The camera occupies two rooms with the bellows of the unit projecting through the connecting wall. A variety of lens are used; the largest with a focal length of nearly 6 feet.

* * *

To obtain the most economical fuel consumption in the coke-fired, pit-type furnace a British report suggests the following: Clean out the flues. Prevent direct air leakage to chimney or stack by the use of well-fitting refractory furnace covers (iron covers waste fuel through heat losses due to radiation), and if necessary, increase area of air port inlet to firebars. See that chimney or stack is in good repair (particularly if made of steel) and free from perforations near base. Check area and height of stack to insure that it is capable of giving the draft required. Increase stack size if possible or alternatively supply additional air required by installation of a fan. If the latter method is adopted it may be necessary to enclose pit with steel plates so that a higher air pressure is created at the fire bars than at the flue.

* * *

TO guide the men who pour the metal into a wide variety of snap flask molds on conveyor lines, the molder sprinkles a small amount of colored powder on top of the molds. Green powder indicates that the mold is to be poured with a certain grade of metal. Other colors convey the same information in regard to the metal required on other classes of castings. Formerly metal or cardboard tags were employed for the same purposes, but it is claimed the powder method is more satisfactory in many respects.

* * *

A life of approximately 5 months for cast iron pots used in melting zinc-base alloys for die blocks is secured from a composition containing 1.6 per cent silicon, 0.6 per cent manganese, 3.4 per cent carbon, 2.2 per cent nickel and 1.1 per cent chromium. Pots are normalized at 750 degrees Fahr. for 10 hours, and then exposed to the weather to develop a slight coating of rust. When first placed in service the pots are warmed to 200 degrees and coated with a wash of fireclay suspended in water with a small amount of sodium silicate. Metal in the pot should be kept under a temperature of 900 degrees since overheating causes iron contamination.

* * *

A new development is plastic pipe produced in the same dimensions as extra-strong steel pipe of 2 inches outside diameter or less which may be used to release rubber, copper and other vital pipe and tube metals for more urgent needs associated with the war effort. The plastic pipe is said to be resistant to extreme moisture, chemicals and only a few solvents exhibit any adverse effects. It is made of a new thermoplastic resin which is odorless, tasteless and nontoxic. Its toughness and abrasion resistance are said to be of a high order. The pipe is nonscaling, withstands freezing, and heat resistance excellent up to 175 degrees Fahr. It can be cut with a wood or hack saw, threaded with ordinary pipe dies, readily welded, heated and bent.

* * *

A screen mounted on an articulated arm under a sand chute is used to distribute the first thin layer of sand over patterns in large flasks. The flasks then move forward on a conveyor to a point where the molders set any necessary gaggers, sprues, rods or chills before the sand chutes from an overhead hopper are opened to fill the flask with sand.

* * *

In a machine tool foundry where cast iron arbors are used extensively in the cores, a permanent bed is maintained for the construction of these reinforcing devices. Since the entire shop floor is concrete, the sand bed is 10 inches deep and enclosed on the ends and sides by a concrete wall. The walls are parallel and level and serve as guides for the long straightedge employed in resurfacing the bed after each batch of arbors is removed. The arbor bed occupies space in the immediate vicinity of the core-making department.

* * *

USE OF a fluorescent liquid and black light has been developed for location of surface cracks and porosity, and similar defects in nonferrous alloy castings. With hollow articles the liquid can be poured in the inside and observation made of the appearance on the outside. In use the article to be examined is soaked in the liquid for a period from 1 minute to an hour depending on the fineness of the crack, etc., and removed; allowing the excess liquid to drain back into the bath. Then it is washed with a high pressure water spray. The part is dried by dipping in hot water and placing in stream of warm air. When dry a special powder is applied which draws the fluorescent penetrant from the cracks after which it is examined under black light.

VELSICOL CORPORATION

TRADE MARK REGISTERED

Petroleum RESIN MODIFIED **CORE OIL**

Don't let conventional type, poorly adapted core oils slow production in your foundry. Forget your buying habits of pre-war days and investigate VELSICOL *Resin Modified Oil* for core making. You'll find it particularly well suited to the special problems of Aluminum and Magnesium casting.

Assures good collapsability, is faster drying and has remarkably low gas content. Furthermore you can *get* it. Velsicol, as pioneer producer of petroleum resins for foundry use, has developed rigid controls that keep these resin modified core oils uniformly excellent.

Result:—you can produce more perfect cores more economically, reduce core breakage and speed production.

WRITE

Samples, Full Information On Request

THE VELSICOL CORPORATION

120 EAST PEARSON ST., CHICAGO, ILL.

EMPHASIS on the production of aluminum and magnesium, as exemplified in the recent WPB order upgrading such projects and giving equipment a rating of AA-1 and materials a rating of AA-2x, will have considerable effect upon numerous projects in the foundry industry. As has been mentioned previously, a number of ferrous and nonferrous plants are being converted to the production of aluminum and magnesium castings. In other cases entirely new foundries are being built for that type of production. Among the plants either just getting into production, or working in that direction are the following: Howard Foundries Co., Chicago; Hills-McCanna Co., Chicago; American Radiator & Standard Sanitary Corp., Louisville; American Radiator & Standard Sanitary Corp., Elyria, O.; Humphrey Mfg. Co., Mansfield, O.; Quality Castings Co., Orrville, O.; Maryland Sanitary Mfg. Corp., Baltimore; General Motors Corp., Detroit; Ford Motor Co., Detroit; Chrysler Corp., Detroit; Chicago Railway Equipment Co., Chicago; National Radiator Corp., Johnstown, Pa.; Bohn Aluminum & Brass Corp., Detroit; Dow Chemical Co., Bay City, Mich.; Packard Motor Car Co., Detroit; Maytag Co., Newton, Iowa; Aluminum Co. of America, Pittsburgh, and National Bronze & Aluminum Foundry Co., Cleveland. When these projects have been completed the capacity for the production of aluminum and magnesium castings in this country will have been multiplied many fold.

—□—

Production of steel castings in September fell to the lowest point of the year, according to the report of the Department of Commerce. The output for that month was 124,433 tons as compared with 135,855 tons in August and 118,543 tons in September, 1941. Production in September of this year was divided into 11,000 tons of railway specialties, as compared with a high of 48,335 tons in March, and 113,433 tons of miscellaneous castings as compared with a high of 122,986 tons in August. Orders, on the other hand, moved to 160,300 tons in September as compared with a low for the year of 135,777 tons in August. Just what caused the marked reduction in orders in August is not plain, but it would seem that the down trend has been reversed. Also the demand for railway specialties should increase since Washington now has recognized the need for repairs and replacement of railroad equipment, which is being worn out at a prodigious rate.

—□—

When a sizable number of companies in the East were asked recently if their sources of steel castings were adequate to meet present needs, 82 per cent answered yes and 18 per cent said no. On the matter of substitutions, 24 per cent had been using gray iron or malleable iron castings in place of steel castings to a substantial degree, while 76 per cent had made no substitutions. Thirty-five per cent thought some of the substitutions would be permanent and 65 per cent considered them temporary.

—□—

While orders for malleable castings increased slightly over 20,000 tons in September, as compared with August, the total production advanced just slightly under 2000 tons. Orders reached the high point of 85,181 tons as compared with 63,978 tons in August and 64,283 tons in September, 1941. This may indicate that the work of conversion to malleable castings is being accelerated. Production in September was 58,687 tons compared with 56,304 tons in August and 69,175 tons in September, 1941. It is interesting to note that shipment in September totaled 56,664 tons compared with 56,651 tons in August.

—□—

War may bring out pugnacious tendencies here at home. A recent Ohio accident report states: "Several negro laborers in a foundry were bantering each other when one of them became angry and wanted to fight. He started toward one of the men who was handling a ladle of molten metal and the latter swung at him with the ladle, the contents of which were spilled over the victim's body, causing severe burns about the chest which sent him to the hospital."

—□—

A recent news story out of Detroit carries the following interesting information on tank production: "Shortcut methods of production have been obtained by redesigning the final drive, which reduces the machining time and speeds up assembly, and by casting the gun mount. Time needed for producing the gun mount, which was previously constructed of 27 fabricated parts, has been reduced two-thirds through a method of turning it out in three castings."

—□—

The other evening in addressing members of the Northeastern Ohio Chapter of the A.F.A., Dr. W. E. Wickenden, president of Case School of Applied Science, Cleveland, said that "lack of confidence in our ability to plan the post war period is inhibiting our war effort." This statement presents a challenge to the American people. Are we so worried about our ability to win the peace that we are unable to provide the necessary all out effort on the home front to win the war? Wherever you travel, men and women are talking about the mistakes that were made a quarter of a century ago, and are wondering if this time we can write a treaty of peace which will make it unnecessary for our children's children to go to war 25 years hence. Leadership of the right kind can restore that confidence.

—□—

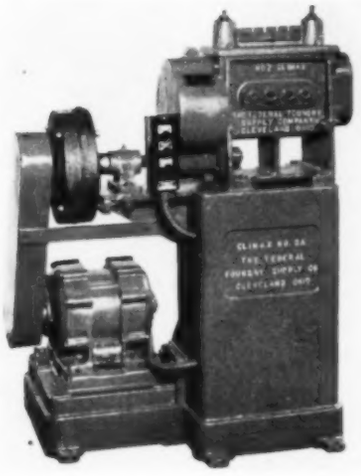
The foundry industry needs a good publicity agent, or perhaps in modern terminology, a vice president in charge of public relations. While other products and methods of fabrication are being described to the public through the medium of the popular press in terms that can be understood by the layman, seldom is anything presented on the subject of castings. The other night I was reading one of the gadget magazines and was told about welding, plastics, plywood, and other materials. But nothing was presented on the subject of castings. While many of the most interesting recent developments in castings are at present considered military secrets, there is enough interesting and valuable data available which could be fed to the general public in palatable doses of a not too technical construction. Let's have a little more showmanship.

F. G. S.

IT'S NEVER TOO LATE

to start saving!

ON STEEL



THE CLIMAX NO. 2A

WIRE STRAIGHTENER

You can save on steel by re-using core wires and rods. Reduce your use of steel and rid yourself of the headache of buying new wires.

The ideal way to render used core wires fit for further use is by putting them through a Climax Wire Straigthener. The Climax really *reconditions* used wires!

The Climax is made in three sizes to handle different wire sizes. Each size is available motorized or not as you prefer.

Write for our new circular—see how you can save on steel.

WONDER CUTTER

You can save on cutting rods and wires by using a Wonder Cutter.

This low price cutter handles rods up to 5 8 inches diameter also band iron up to 1 8" x 2". A gauge permits repeated cuts to same length.

Even with a limited amount of cutting you'll be ahead with a Wonder Cutter.

ON SCRAP

The ideal way to save on scrap is to cut the production of it. Both of the items described below will help to do just that.

FEDERAL CHAPLETS

"The Twist Does The Trick"

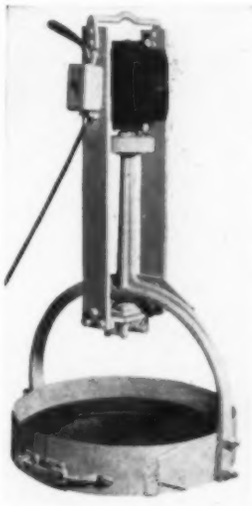
Federal Twisted Stem Chaplets cut scrap production by eliminating chaplet failure. Here's four reasons why:

They remove fusion troubles since the four sharp edges of the square twisted stem ensure perfect fusion from head to head.

They will not burn in and let cores collapse since there are no weak deformed sections in the entire stem length.

They prevent gas pockets for the stem is smooth and offers no place to trap dirt or gas.

The electrically welded heads will not loosen or come off.



THE NEW LOWE ELECTRIC SIFTER

Here's a riddle that cuts scrap losses by giving your men a better sand to work with.

Sifting speed has been increased by a new design malleable yoke that adds "zip" to the riddling action. Sand is more thoroughly aerated and easier to work with.

The new Lowe is easier to load too. A newly designed lower bearing gives more shovelling clearance, permits dumping every shovelful onto the screen without consciously steering each load.

A totally enclosed ball bearing motor plus adequate protection of all other moving parts ensures long wear with the Lowe Sifter.

THE FEDERAL FOUNDRY SUPPLY CO.

4600 EAST 71st STREET, CLEVELAND, OHIO

CHICAGO — CHATTANOOGA, TENN. — DETROIT — MILWAUKEE — MINNEAPOLIS — NEW YORK — RICHMOND, VA. — ST. LOUIS — UPTON, WYO.

INTERNATIONAL MOLDING MACHINES

Castings are required for building many of the most vital War Implements. The castings are almost invariably the first parts that are needed when the construction of the implement starts

WAR Implements must be made in large quantities and all parts used in their construction must be turned out on a **HIGH PRODUCTION** basis—with ceaseless continuity and perfection.

USE INTERNATIONALS to insure the maintenance of casting production schedules. Call for **INTERNATIONAL** Service Engineers to demonstrate the latest developments in **HIGH SPEED** equipment and methods.

INTERNATIONAL MOLDING MACHINE CO.

2608-2624 W. 16th STREET · CHICAGO, ILLINOIS

HANDLES FOUNDRY MATERIAL

By New Method

HANDLING of cupola firebrick, rough cut stone and raw materials in bags for use in the foundry by means of a truck and pallet system is proving advantageous in the foundry of Pontiac Motor Division, Pontiac, Mich., greatly facilitating the unloading, transporting and storing of the various materials.

Materials for the foundry as they are shipped from vendors' plants are piled evenly and stamped on low platforms or pallets. Eighteen to 20 pallet loads fill the ordinary type railroad box car of approximately 35 tons capacity.

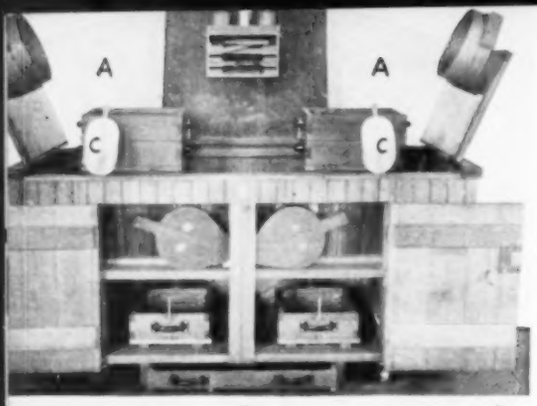
The unloading operation is simple. High-lift tilting fork trucks are used. The truck operator drives the truck into the box car, picking up one loaded pallet at a time. In less than one hour the entire carload is emptied and compactly stored, without any manual handling. When a supply of the material is required at the cupolas a fork truck lifts a pallet load out of the storage area and deposits it wherever required.

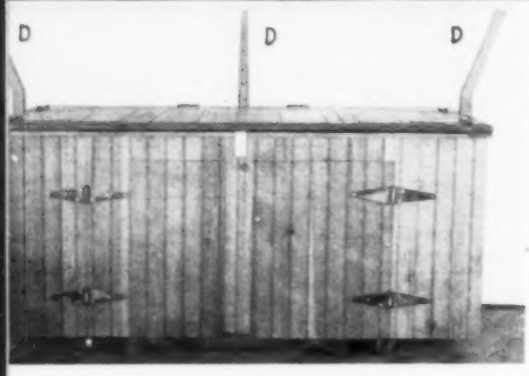
Until this new method of handling was devised block and stone were received in bulk carloads, and still are at many foundries. Cars were unloaded by hand and the material placed on stock platforms. Loads were then trucked to storage and rehandled into storage piles. A third handling was necessary when a supply had to be delivered to the cupolas. By the old method when a 35-ton carload of blocks had finally been placed in the cupolas, the men had handled 105 tons of material.

Briefly the benefits of the improved handling system claimed by Pontiac production men are: Speedy release of freight cars for other service; quicker clearing of rail sidings thus permitting fast spotting and unloading of other carloads of foundry supplies; speeding up cupola repair work; reduction of loss through breakage which always resulted with manual handling, and a great saving in space resulting from the tiering up of pallets to a height of 10 feet, thus increasing the productive use of floor space about one-third.

Foundry officials are so well satisfied with the fork truck and pallet system that it will be extended to other classes of foundry supplies.

Left—Corn flour in 100-pound sacks and used in cores is handled on pallets. Pontiac's foundry uses 6000 pounds of corn flour daily. Left below—Cut stone, cupola blocks and other materials are handled and stored efficiently by the new method. Below — Storing cupola blocks in the Pontiac Motor division foundry. The view illustrates the new method of handling developed by that foundry





DESIGNS
MOLDING CABINET FOR SCHOOL

By H. J. McCASLIN

IN SCHOOL departments where molding demonstration and practice are carried on within a class room, the lack of ample floor space, storage facilities and control of the loose sand frequently become troublesome problems. The dual molding trough and equipment cabinet as illustrated was designed to alleviate this situation. Use of the cabinet over a portion of two years has demonstrated the practicability of the arrangement.

An open cabinet as shown in Fig. 5 affords a clear idea of the general set up. To prevent distortion, all surfaces likely to be affected by the moisture of the sand are sheathed with copper. The center lid is attached with loose pin hinges for easy removal, thereby permitting the instructor to face the students during class demonstration. Canvas aprons as shown at *A* are used to prevent escape of loose sand. They are attached to the lids by eyelets which engage the projecting heads of screws.

The unit is mounted on castors so that it readily may be moved about for demonstrating and cleaning purposes. A tool rack is suspended from the top edge of the center lid by two side hooks and is within easy reach of the workman.

Round head screws which project from the surfaces of the end lids engage the cross wires of the riddles *B* and support these adjuncts. Riddles 12 inches diameter are easy for the boys to manage and are of adequate size for the flasks employed. No better way was found for controlling the sand than through the use of aluminum scoops shown at *C*.

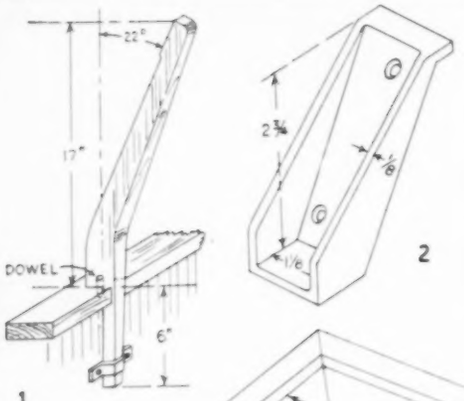
Weight was the determining factor considered in the dimensioning of the flask equipment. It was based upon the ability of the average boy of early high school age to safely handle alone a mold not exceeding 65 pounds. A mold 9 x 12 inches 7 inches deep comes within this weight. Flasks of these dimensions were adopted for the rudimentary exercises. The cheek sections shown in the compartments below were provided for more advanced work.

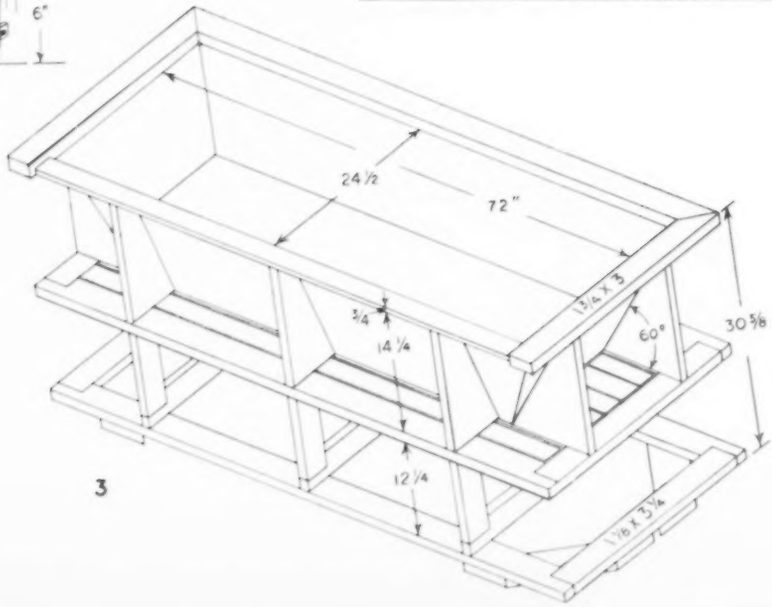
Handles shown on the bench flasks may be considered unorthodox by the average molder, but their use in this instance was highly serviceable.

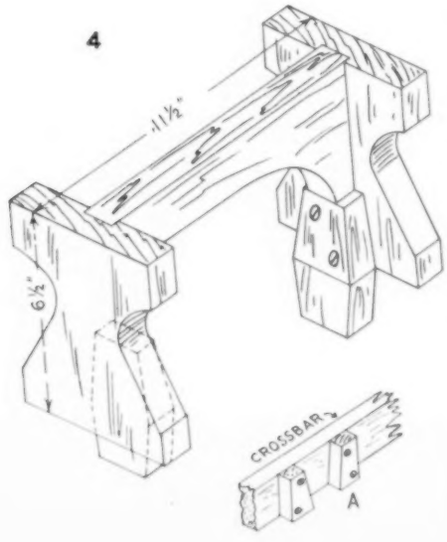
Directly in the rear of the flasks and therefore not visible in the illustration are the stools shown in Fig. 4. Their purpose is to support the cope sections during the finishing of the molds. Proportions of the stools are such that they may be stored within the flasks. The auxiliary sketch *A* shows the method for seating the stools upon the flask supporting cross

(*Concluded on page* 137)

Fig. 1—Props for supporting open lids or covers. Fig. 2—Saddles for cross bars. Fig. 3—Frame construction with dimensions. Fig. 4—Stool for supporting the cope during finishing of the mold. Figs. 5 and 6 (left above)—Molding cabinet open and closed to show arrangement







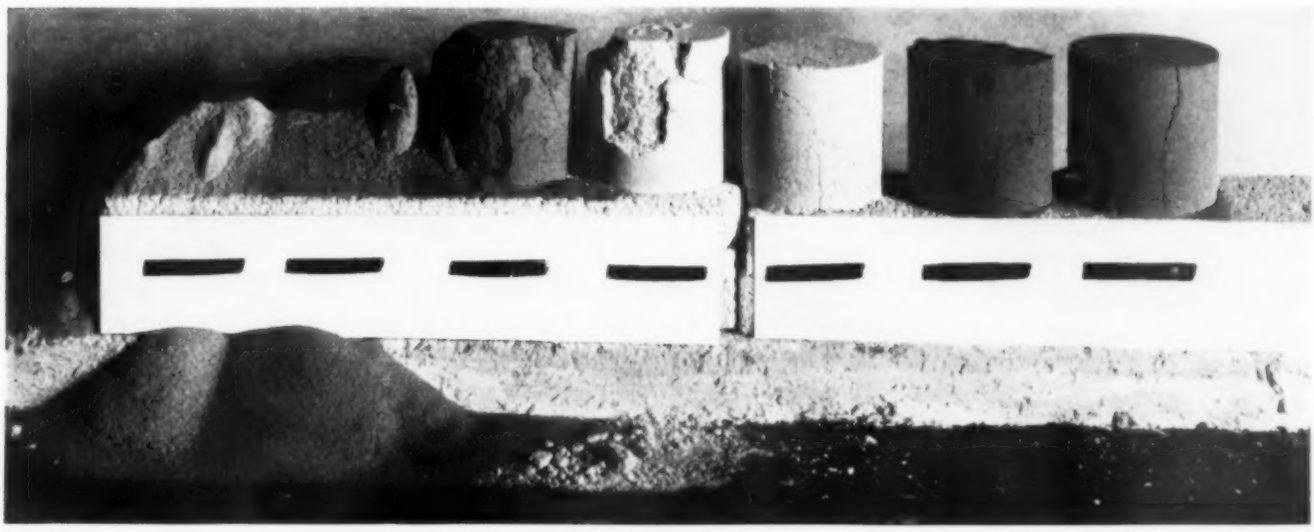
VOLCLAY BENTONITE

NEWS LETTER

REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE

Do you know how far heat penetrates into a mold after pouring? How hot does the sand get one-half inch from the casting? Two inches from the casting?

What is the effect of these temperatures on the sand in successive layers away from the mold face? What happens after the sands cool? How does this effect compare when using different types of bond clays and molding sands?



Specimens Exposed To Same Heat, Same Length of Time—WHY THE DIFFERENCE?

These and other questions answered in a new illustrated bulletin – "Heat Penetration Into Volclay Molds and Its Effect on Sand." Published in the interest of distributing practical information to foundrymen. Send post-card for your free copy. No obligation.

A Different Subject—DELIVERIES

No Volclay customer has had occasion to complain of delay in shipment. Really it is only because we were lucky in having greatly increased our facilities last year. Also we are lucky in having enormous deposits and good stock piles. The expansion of Volclay output capacity exceeded even the current large requirements of our customers – we hope they ask for more. We can also take on new customers and hope they ask to COMPARE Volclay quality with other bentonites.

VOLCLAY BENTONITE HAS SERVED FOUNDRIES FOR 15 YEARS!

Produced by

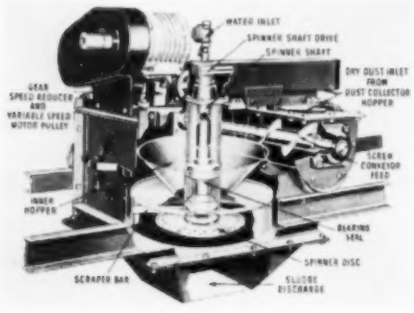
AMERICAN COLLOID COMPANY

363 WEST SUPERIOR STREET • CHICAGO, ILLINOIS

new equipment and supplies

Screw Conveyor

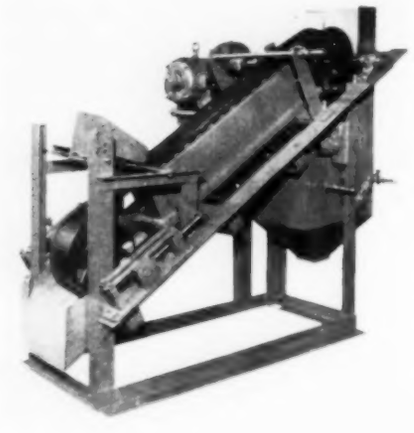
American Foundry Equipment Co., 555 South Byrkit Street, Mishawaka, Ind., has added a screw conveyor feed to its wet disposal unit, designed to make a wet sludge of the dust discharged from the hoppers of dry type dust collectors. Dust from the hoppers falls through a flexible coupling and is deposited directly into the screw conveyor. The rate at which the dust is fed into the mixing chamber is controlled through gear speed reducer and variable speed motor pulley. As the



dust enters the unit, water or other liquid is discharged at the center of a high speed mixing disk to form an instantaneous mixture. The resulting sludge is discharged at the bottom. Any desired sludge consistency can be had by controlling the admission of the volume of dust and water.

Separator

Dings Magnetic Separator Co., 509 East Smith Street, Milwaukee, has introduced an improved high intensity magnetic separator for the reclamation of valuable alloy steels from grinding fluids. Coolant fluid from the grinder is fed to the separator. The magnetic portion of the fluid is pulled along by the main conveyor belt over a series of alternating pole magnets. A water spray continually washes the material. All nonmagnetic material is washed from the product and the final concentrate is a pure magnetic product of alloy steel. Transformer oil inside the casing helps to cool the coils and prevents water entrance. This insures trouble free operation. The separator is supplied complete with motor drive and ready for installation.



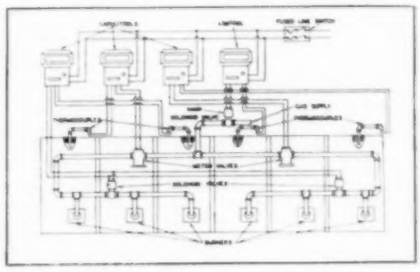
Protective Clothing

American Optical Co., Southbridge, Mass., has developed a complete line of tailored protective clothing for women welders, claimed to be styled according to accepted dressmaker patterns. Light in weight, made from specially selected chrome tanned cow hide, the clothing protects wearer from flying sparks. Complete line includes a tailored cap, short jacket,

coat, overalls, sleeves and 36-inch tailored apron. Besides adding a note of smartness, the welted inseam construction provides extra strength and protection from sparks. The cap has flaps extending over the ears. A side placket in the overalls insures a trim comfortable waist line. Yoked backs of the coat and jacket permit free arm movement. Shaped sleeves provide comfort, easy arm movement and longer life than a straight shapeless sleeve which wrinkles at the fold of the arm.

Heat Control

Wheelco Instruments Co., Harrison and Peoria Streets, Chicago, has introduced a temperature control apparatus designed to maintain even heat throughout a multiple burner furnace or oven regardless of heat loss at the door, and to give protection against excessive temperature in the event of thermocouple break or other accident. Application of the device is shown in the accompanying illustration. One temperature control in-

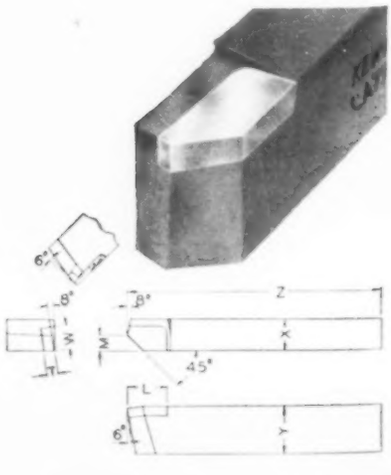


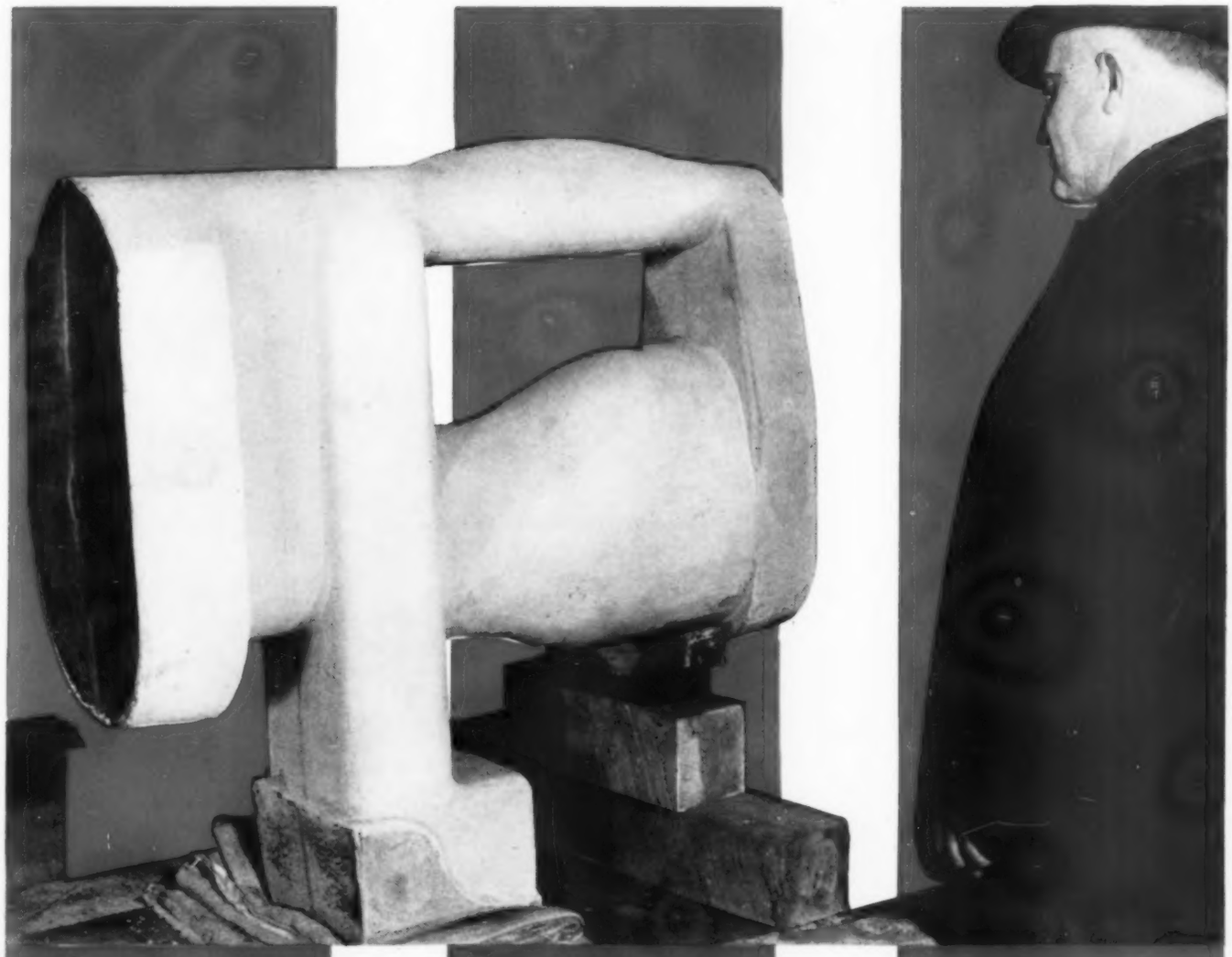
strument actuates two solenoid valves and is actuated by a thermocouple at the center of the furnace. Two thermocouples at the furnace ends actuate two other instruments which in turn operate two motor valves. This arrangement permits operation of the furnace with a higher temperature at one end if necessary. In either continuous or batch type operation, the temperature control arrangement provides the exact temperature desired at all points in the furnace or oven.

Cutting Tool

McKenna Metals Co., 131 Lloyd Avenue, Latrobe, Pa., has introduced new styles in steel cutting carbide tools which combine the lead angle or side

(*Continued on page* 118)





Un-Happy New Year...
Dis-Honorable Tojo!

WHAT you didn't realize, Jap...when you rubbed your paws together that December 7 of 1941...was that you had turned on the most prodigious flow of castings the world has ever known.

What you are beginning to realize now, as faster and faster flawless castings pour from America's foundries, is that 1943 promises to be the first of many un-happy years for your deluded people.

SHARING in the credit for the job America's foundries are doing is Penolyn Core Oil. Quick-baking, fast cleaning, it minimizes gas-forming tendencies, reduces rejects, increases the number of perfect castings from perfect cores.

Penola's engineers welcome every opportunity to help solve America's casting problems. Call 'em in when you need 'em.

PITTSBURGH, PA.

Penola
Reg. U.S. Pat. Off.

NEW YORK
CHICAGO
DETROIT
ST. LOUIS

(*Continued from page* 116)

cutting edge angle with a tip for longer than customary tools having a lead angle. It is claimed these tools are particularly economical in shell turning operation because only the edge on the lead angle is sharpened and it is easy to maintain the control position of the nose as the tool is reground. The chip breaker is ground only on the section parallel to the lead angle. Tools are available in sizes from $\frac{1}{8}$ x $\frac{5}{16}$ x $\frac{5}{8}$-inch to $\frac{3}{8}$ x $\frac{3}{4}$ x $1\frac{1}{2}$-inch and also may be used for chamfering operations.

Drum Truck

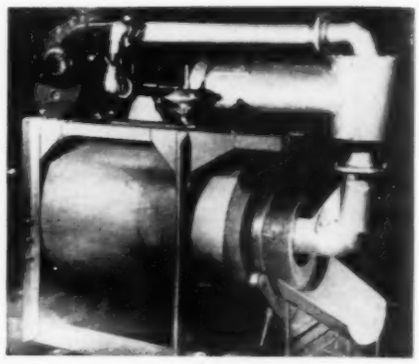
American Pulley Co., 4200 Wissahickon Avenue, Philadelphia, has introduced a new line of pressed steel hand trucks, and designed for handling drums, barrels, kegs or any container with a chime or bead. In capacities up to 1000 pounds the truck makes barrel or drum moving a one man job and loads a drum without the need of first moving it away from adjacent drums. A sliding hook on the center rail catches the top bead or chime. Trucker pulls down on handles to tilt the drum. This allows nose prongs to slide under the bottom bead. As the truck handles are lowered the nose prong lifts the drum or barrel off the floor.

Control Unit

Upton Electric Furnace Division, 7450 Melville Avenue, Detroit, has developed a new temperature-control for salt bath heat treating which measures and adds the correct amount of power and also corrects any error on the part of the operator in setting the control. Equipment consists of a panel stand, pyrometer, timer, ammeter and signal light. A cabinet beneath the panel houses three heat selector levers. A foot operated circuit interlock unloads the hand lever switches to avoid burning contact points. When the work goes in the bath the operator touches the start button and the control takes over. When the time is completed, the current drops back to the holding value and the signal light warns the operator to remove the work.

Dryer

Salem Engineering Co., Salem, O., has developed quenching and drying mechanisms for use in connection with the large annealing furnaces. Materials may be charged into the dryer by individual feeder equipment, or the dryer may be used with a continuous line of other equipment. Materials are conveyed through the dryer by an internal spiral screw and the materials are tumbled as they are dried. Capacity for small steel parts is 9500 pounds per hour. Drying is accomplished by hot air blown into the interior of the perforated drum. Dryer is furnished complete with automatic temperature control, variable speed drive, etc. The mechanism may be built for a wide range of products where temperature requirements approximate 400 degrees Fahr.



Lens Pencil

American Optical Co., Southbridge, Mass., has introduced a new type antifog lens pencil to keep safety goggles from fogging. The new compound, according to laboratory tests, secures good antifogging results for a long period of time thereby increases the efficiency of workers in steamy surroundings. It is further claimed that the new pencil lasts a long time without crystallizing or crumbling.

Siren

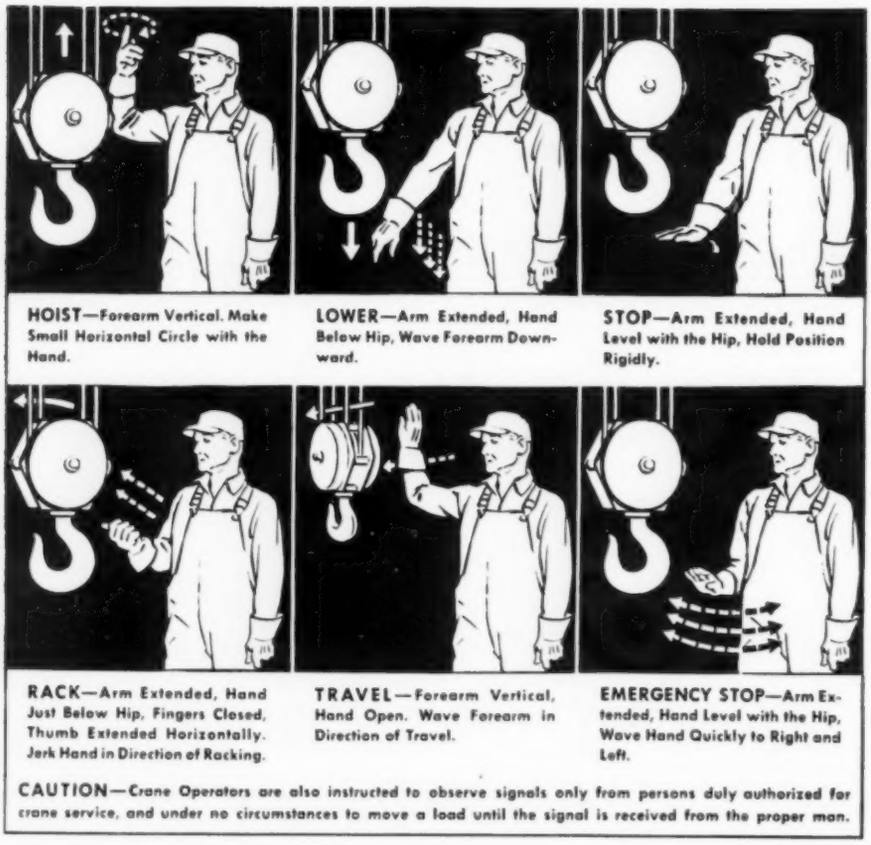
Breuer Electric Mfg. Co., 5100 Ravenswood Avenue, Chicago has developed a new type siren specifically designed for industrial use. One model is for small departments, offices, laboratories, stock rooms, etc. A larger size is for manufacturing areas, where it is claimed it will be heard above the usual din of machinery. The sirens are equipped with Universal motors for either alternating or direct current. They operate from any ordinary light circuit and thus are effective at all times, day or night. Each siren is mounted on a base for either vertical or horizontal mounting.

Welding Electrode

Air Reduction Sales Co., New York, has developed a new electrode in sizes $\frac{1}{8}$ and 5/32-inch, designed specifically for all position welding of mild steel with alternating current type welding machines. It is claimed the new electrode complies with all requirements of the American Welding Society classification E6011, American Bureau of Shipping, Group HIG and BIG. It is stated that physical tests demonstrate the high quality of deposited metal is comparable to the best direct current reverse

(*Continued on page* 121)

Standard Crane Hand Signals


HOIST—Forearm Vertical. Make Small Horizontal Circle with the Hand.
LOWER—Arm Extended, Hand Below Hip, Wave Forearm Downward.
STOP—Arm Extended, Hand Level with the Hip, Hold Position Rigidly.
RACK—Arm Extended, Hand Just Below Hip, Fingers Closed, Thumb Extended Horizontally. Jerk Hand in Direction of Racking.
TRAVEL—Forearm Vertical, Hand Open. Wave Forearm in Direction of Travel.
EMERGENCY STOP—Arm Extended, Hand Level with the Hip, Wave Hand Quickly to Right and Left.
CAUTION—Crane Operators are also instructed to observe signals only from persons duly authorized for crane service, and under no circumstances to move a load until the signal is received from the proper man.

Operating an overhead traveling crane efficiently and safely calls for teamwork. The man at the controls and the floormen must use the same language. Standard operating signals for cranes, shown in the above illustration, have been prepared on cards suitable for hanging by the Harnischfeger Corp., Milwaukee

Portable Grinding
with
STERLING
Grinding Wheels
● It is a six page folder, full of information every foundry foreman will want to pass on to his workmen. Attractive, concise, informative . . you need it for proper wheel selection.

HERE'S A SPECIAL STERLING FOLDER *THAT WILL SOLVE Your Portable Grinding Problem!*

CASTING grinding problems have been getting tougher every day . . that is why Sterling offers you an important folder on portable grinding - to help you select "the wheels of industry" best suited to the work you are trying to get out in record time.

New, inexperienced workmen will welcome the informative writeup on safe portable grinding, and the easily-understood explanation of the types of wheels to use on alloy steel, welds, cast iron, aluminum, brass and bronze. Older workmen will find many valuable hints in this new folder which will help them do a faster, better casting grinding job.

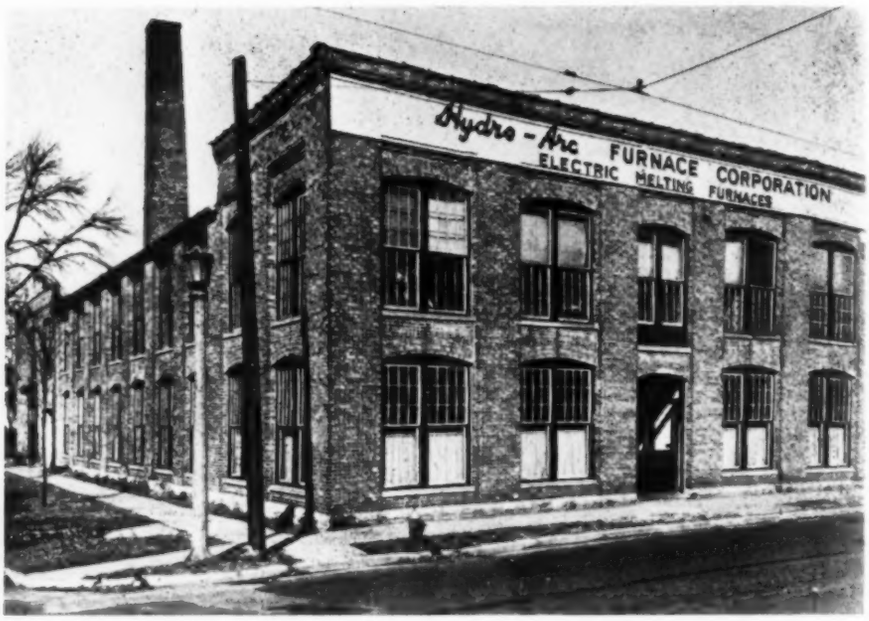
Especially important is the Sterling Wheel Marking Analysis which is thoroughly outlined to make possible quick, accurate identification of wheels you may now be using.

. This new folder is available to all foundry foremen requesting it on the letterhead of their company. It is our contribution to victory . . . ask for it.

In the meantime, Sterling engineering service is available to all who need it. Your request entails no obligation and may be the means of increasing your grinding efficiency . . write for the services of a Sterling engineer - today!

Announcing
OUR NEW PLANT

GENERAL OFFICES
•
ENGINEERING DEPARTMENT
•
COMPLETE MACHINE WELDING AND STRUCTURAL SHOP
•
for building
MORE
HYDRO-ARC ELECTRIC FURNACES



OUR FORMULA

Experienced Engineering + Manufacture + Shop Assembly + Testing + SERVICE

EQUALS

Customers Satisfied with BETTER Electric Melting Furnaces

Come out and see us building Hydro-Arc Electric Furnaces. Look at our *accurate, fast, hydraulic controls* and *power operated electrode clamps*—fast—close control—keeps the men off the furnace.

HYDRO-ARC FURNACE CORPORATION

Telephones: La Grange 4545 and 4546
Chicago line: Enterprise 1068

561 Hillgrove Ave., La Grange, Ill.
(A suburb of Chicago, Ill., U. S. A.)

ASSOCIATED WITH WHITING CORPORATION

(*Continued from page* 118)

polarity electrodes. Welded tensile specimens show ultimate tensile strength as welded 70,000 to 75,000 pounds, and stress relieved as 65,000 to 70,000 pounds. Elongation in 2 inches as welded 25 to 30 per cent and as stress relieved 30 to 35 per cent. It is claimed that average operators have no difficulty in securing good fusion and complete penetration.

Carboy Truck

Industrial Products Co., 2820 North Fourth Street, Philadelphia, designed a new truck to handle carboys with ease and safety. Shafts are adjustable for any size carboy and the 24-inch diameter wheels are sufficiently large to carry the load over rough floors. It is claimed these trucks reduce handling costs and prevent personal injuries where carboys are moved or routed regularly.

Heavy Duty Truck

Baker Industrial Truck Division of the Baker-Raulang Co., Cleveland, recently has placed on the market a heavy duty, 10,000-pound capacity crane truck in which efficient operation is due in part to the reduction of dead weight. Hoist units serve as counterweights. Safety of operation is assured because the bridge over the top of the battery is closely spaced so that the operator can look along either side. The tall mast on which the superstructure slews gives two widely separated bearing points and permits a higher position for the topping cable idler sheave. Also gives a more favorable angle of pull when raising the boom. All controls are located on the dash and do not swing with the superstructure.

Hair Guard

Standard Safety Equipment Co., 232 West Ontario Street, Chicago, has developed a hair guard in three styles for women in industry, particularly where moving machinery is employed. It is claimed the hair guard is a definite protection for drill press operators, assembly line workers and on some inspection jobs. Goggles easily are slipped on or off. Likelihood of burned or scorched hair is lessened during welding operations.

Shows Temperature

Tempil Corp., 132 West Twenty-second street, New York, has added a liquid temperature indicator to its line of thermometric products. The liquid indicator is available in a wide range of predetermined melting points between 125 and 1600 degrees Fahr. In use a thin smear or daub is applied to the working surface, and it dries quickly. When the temperature stated on the bottle is reached the smear liquifies, and on cooling solidifies, leaving a glossy or vitreous mark distinctly different from the original appearance of the smear. The material is marketed in 1½-ounce bottles which will give 300 determinations.

Heat Lamps

Birdseye Division of the Wabash Appliance Corp., 335 Carroll Street, Brooklyn, N. Y., has introduced a new line of infrared heat lamps including six clear types, three ruby types and four reflector types. All feature the M-type tungsten filament for even, uniform heat distribution. Bases are reinforced with asbestos lined mechanical straps to withstand temperatures of tunnel installations. Reflector types have built in reflector linings of pure silver sealed inside the bulbs for protection against dimming and tarnishing by fumes or dirt. Average burning life on all is in excess of 6000 hours. Advantages claimed for infra-red are speed, ease of operation and economy.

Lift Trucks

Lewis-Shepard Sales Corp., 123 Walnut Street, Watertown, Mass., has placed on the market a line of medium capacity industrial lift trucks, tilting fork type, telescopic and nontelescopic. The trucks, gas or electric powered, are rugged, compact and low slung, with a one piece, ribbed and reinforced single casting main frame which keeps the center of gravity low and thus adds to stability and maneuverability.

Pattern Repair

Celastic Corp., Arlington, N. J., has introduced a plastic for repairing foundry patterns. A colloid treated double napped cotton-flannel fabric is impregnated with cellulose nitrate and a fire retardant. Wet down with a solvent, it may be formed into any shape. The material has good adhesive properties and will stick to wood, metal or other materials. When dry it provides a hard, even surface which may be sanded and shellacked. The material dries in 25 minutes with some solvents, but longer drying periods are recommended.

Electric Etcher

Ideal Commutator Dresser Co., Sycamore, Ill., has developed a metal etcher with 14 heats ranging from 115 to 1300 watts, for permanently marking sizes, names, numbers or other information on any kind of metal part. The portable unit 7 x 8 x 10½ inches, weight 32 pounds, includes heat indicating lamp, heat resisting hand piece, heavy asbestos covered secondary cables, renewable work plate, all steel case, alloy tip etching point.

Luminaire

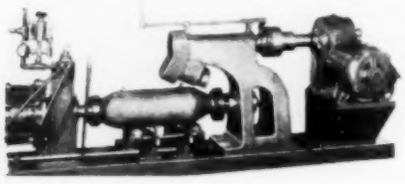
Westinghouse Electric & Mfg. Co., Lighting Division, Cleveland, has developed a new vapor tight luminaire for incandescent or mercury lamps especially adapted for extreme service locations where acid fumes, dust, smoke or excessive moisture is present in the air, either inside or outside the buildings. The unit arranged for conduit mounting includes three parts, a porcelain enameled steel reflector in several sizes, a socket assembly and a hinged glass cover. Reflectors for 300 and 500 watt sizes are 19 gage iron sheet. Larger sizes, 750 and 1000 watt sizes are 18 gage. Vapor tight sealing is obtained with a heavy,

Stator of the type of air raid siren being produced by the Federal Electric Co., Chicago, is a gray iron casting and the rotor is an aluminum casting. The illustration shows the assembly floor where the accurately machined and balanced rotors are fitted to the shafts. Rotor speeds are from 3000 to 8000 revolutions per minute, depending on the size and model

treated asbestos gasket between cover and housing. An impact resisting glass lens ¼-inch thick is designed to withstand sharp temperature changes. If accidentally broken the lens shatters into small dull fragments which do not present a hazardous feature.

Marking Device

J. H. Matthews & Co., 3942 Forbes Street, Pittsburgh, has introduced a machine for marking all required data on the conical tail surface of bombs. Machine features provide for variation and



irregularities in the bomb surface to assure complete and legible impressions. The machine is semi-automatic, made in various sizes for marking bombs from 100 to 1000 pounds. Bomb is rolled into the machine as shown in the accompanying illustration and held in place by a pneumatic thrust chuck at the nose and by a rotating thrust bearing at the tail. A single revolution clutch is tripped by a hand lever. A roller die with interchangeable type rotates the bomb and progressively marks the required data in one line of ¼-inch characters on the tail surface.

Super Sight

Boyer-Campbell Co., 6540 Antoine Street, Detroit, has introduced four new models of magnifying lenses adapted to close inspection, small parts assembly and precision machining. Head is balanced to bracket and can be placed in any position over a wide bench area. One model has two magnifying lenses, the upper 5 inches diameter, lower 4 inches diameter and adjustable to proper focus. Lenses are lighted separately and may be used singly or together. Each of the other models is equipped with a single lens.

Pulley Oiler

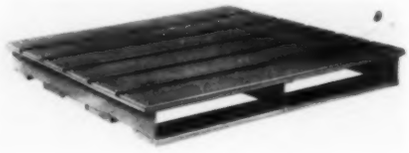
Oil-Rite Corp., 3466 South 13th Street, Milwaukee, has introduced a new wick type lubricator designed to deliver constant, positive and regulated amounts of filtered oil while pulley is in operation, and to prevent oil waste when pulley is idle. The device is a glass reservoir on a hollow stem sealed except for two small ports at the top. A cylindrical felt wick extends through the wheel hub to rest on the shaft. A compression spring holds the wick in position. Centrifugal force throws the oil against the two ports in the stem which admit oil to the wick. Amount of oil is regulated by a small plug. Five standard sizes are available.

Calculator

Berger-Bricker Co., 433 South Spring Street, Los Angeles, has developed a new type calculating device on which it is claimed pay rolls and job costs can be figured in a fraction of the usual time. Operating on a simple new principle, the device includes all hourly rates of pay from $0.50 to $1.75 with a half cent spread between rates. It covers all time periods up to 104 hours with divisions of one-tenth of an hour. The device is handsomely made of lacquered wood and easily fits in a desk drawer.

Pallet

Union Metal Mfg. Co., Canton, O., has developed a pallet consisting of top and bottom wood slats reinforced with steel at the ends and in the center. Bolted construction permits easy replacement of the wood slats, while the steel ends protect the pallet from damage by power fork trucks. It is claimed vital metal is thus conserved without sacrificing strength and all around usefulness and ease of handling is preserved. Accord-



ing to the manufacturer these new pallets are available in sizes to meet any ordinary materials handling requirements.

Navy Makes Changes In Specifications

Bureau of Ships of the Navy Department will use more commercial bronze castings (Spec. 46-B-11-e) for ship work to conserve copper and at the same time make use of surplus plumbing and hardware scrap which now is a drug on the market.

Yellow brass scrap is reported at New York literally to be flooding the market and also is selling well under ceiling prices due to lack of outlets for civilian goods items like plumbing brass. Refineries have not been able to absorb the available supply which has grown not only due to effects of limitation orders but also to the absence of exports.

In view of the large quantities of this scrap, the Navy has decided to use commercial brass castings wherever practicable, taking into consideration corrosion resistance, machineability and strength requirements.

The move is expected to result in a firmer market for scrap.

As a further conservation measure, the Navy has requested the use of 85-5-5-5 ingot (Spec. 46-B-23-c) in place of Navy M metal (Spec. 46-B-8-g) as well as in place of Navy G metal (Spec. 46-M-6-g) as a general purpose bronze where temperatures are not excessive and lower tensile strengths are permissible.

For structural purposes, the Navy will consider the use of Navy No. 1 manganese bronze (Spec. 49-B-3-e). It also is emphasized that either 85-5-5-5 ingot or manganese bronze should be used in place of copper-silicon alloy (Spec. 46-B-28) wherever possible.

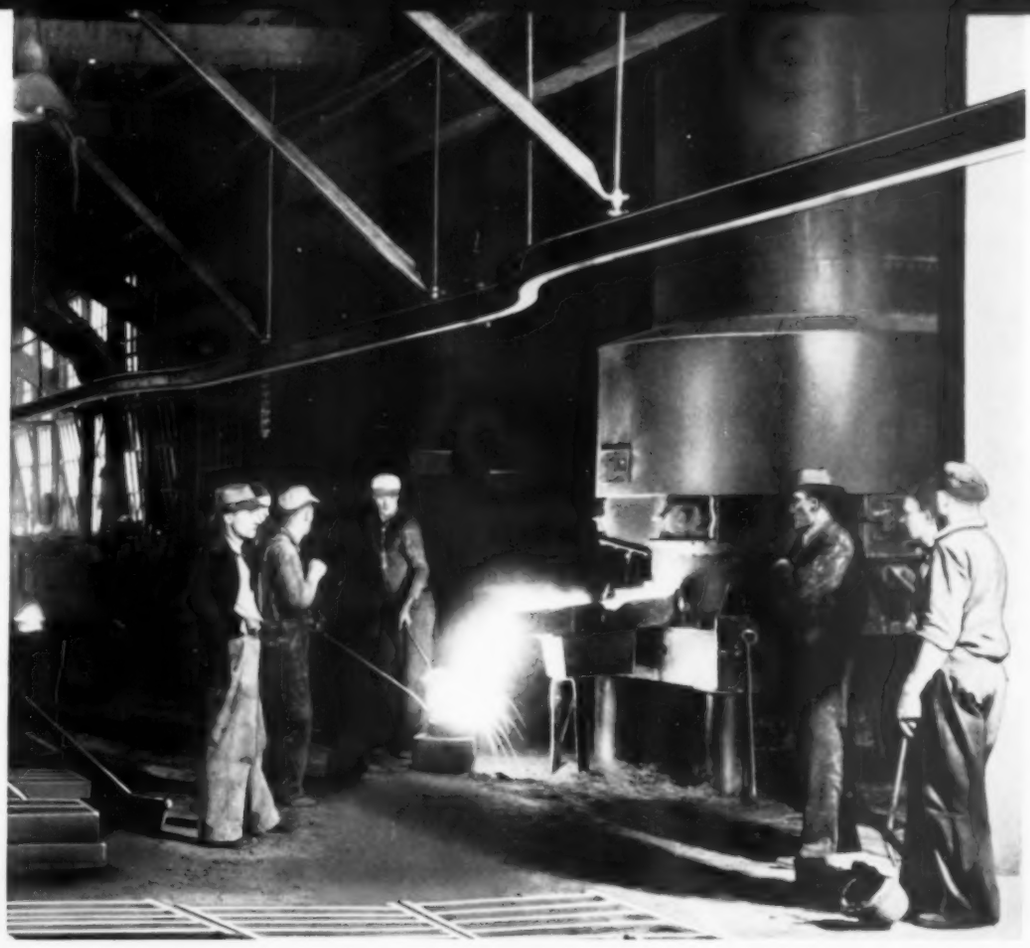
The changes in specifications will require some changes in procedures on the part of foundries handling Navy work. Both No. 1 manganese bronze and silicon-bronze are free-flowing, pouring temperature being around 1800-1900 deg. Fahr. Navy M, G and 85-5-5-5 generally are poured at around 2100-2200 deg. Fahr.

Norfolk Navy Yard Issues Annual

In typographical appearance, layout and contents, the 1942 edition of *Navy Ashore*, published by the Master Mechanics, Foremen and Head Draftsmen Association, Norfolk Navy Yard, Portsmouth, Va., is fully up to the standards set in former years. The cover in full color showing the flag, the American eagle perched on a navy gun and superimposed on a V for victory, strikes the dominant note of patriotism, optimism and confidence reflected on the inside by inspiring messages from Commander-in-Chief of the army and navy, Franklin D. Roosevelt, President of the United States, and from the Commandant of the yard Felix Gygax, Rear Admiral, U. S. Navy. In an abridged version of the message to Congress Jan. 6, 1942, the President declares "No compromise can end the conflict. There never has been—there never can be—successful compromise between good and evil. Only total victory can reward the champions of tolerance and decency and freedom and faith." Pictures in the publication show executive officers of the navy yard, and officers and members of the Master Mechanics, Foremen and Head Draftsmen Association.

To Revise Forms

Forms PD-69 and PD-70, filed by pig iron consumers, are being revised. While it has not been announced when the new forms will be issued, it is believed they will be available in time to apply for January requirements. No basic change in the pig iron allocation system is indicated. PD-69, which is filed with producers by the fifth each month to order pig iron for the following month, was last revised April 8.



WHITING CUPOLAS
for Economical Melting

Whiting Cupolas are now melting over 90% of the grey iron castings produced in the United States. Over 5000 in service testify to their low operating cost and high melting efficiency.

WHITING *Skip Hoist*

Controlled Melting yields BETTER QUALITY CASTINGS

Foundries that have proper control equipment are able to produce castings that meet specifications considered impossible only a few years ago. With accurate regulation of the charge and blast and improved ladle treatment, guesswork is eliminated and castings are uniformly better in quality, with spoilage reduced to almost negligible proportions.

The Whiting engineering staff is in constant demand to correct operating difficulties and advise concerning accessory equipment needed to secure best results. We invite your inquiries.

WHITING *Horseshoe Charger*

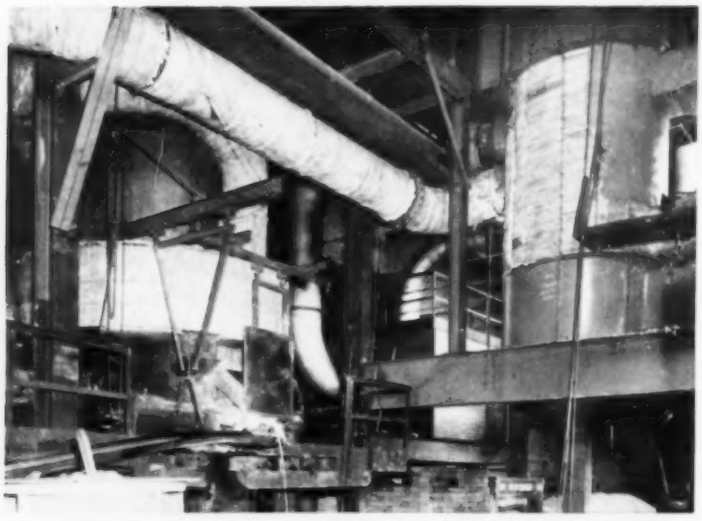
MECHANICAL CHARGING EQUIPMENT
permits Accurate Weighing and Distribution

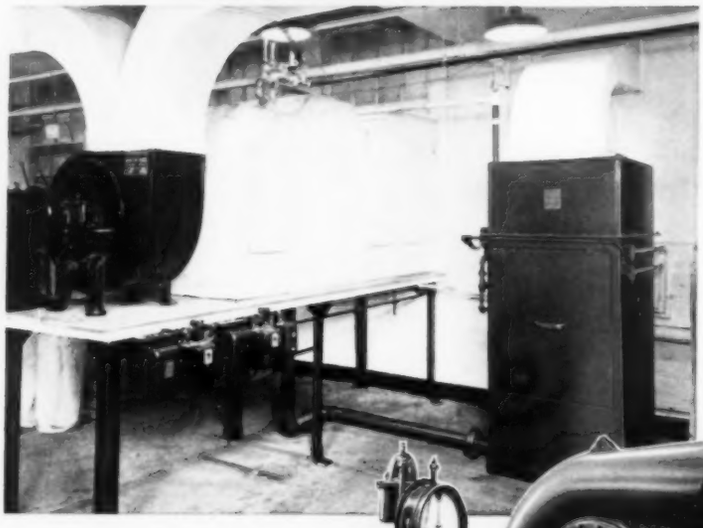
With today's uncertain, inexperienced labor supply, the advantages of Mechanical Charging are especially important. It gives full control of the charge while reducing labor costs. Whiting offers both skip-hoists and crane-type equipment with "wishbone" type bucket charging.

WHITING
CORPORATION

CUPOLAS AND MECHANICAL CHARGING EQUIPMENT

BLAST CONTROL *for Better Castings*





The air required in the cupola must be controlled as carefully as the solid charge if optimum results are to be obtained. Temperature, humidity, and weight of the air supply are all-important factors in foundry melting, and Whiting offers equipment for the accurate control of all three of them.

HOT BLAST SYSTEMS

Preheating the air blast increases combustion efficiency, saves coke, produces hotter metal, and reduces oxidation and sulphur pick-up. Whiting can furnish either the Whiting Externally Fired Hot Blast or the Griffin Process which employs carbon monoxide gases from the cupola stack. Both have proved practical and economical . . . . the choice depends on local operating conditions.

MOISTURE CONTROL

Humidity of the blast has an important bearing on metallic structure and requires close control in the production of fine castings. Whiting Dry Blast Equipment employs the Kathabar System which automatically dries or humidifies the blast as needed to keep the moisture content within very narrow limits. This equipment is economical to operate, and maintenance costs are very low.

AIR WEIGHT CONTROL

The Foxboro Air Weight Control compensates for atmospheric temperature and pressure. It eliminates the slow melting, cold iron, and rejects caused by insufficient air; as well as the oxidation and fuel waste caused by supplying excess air.

SULPHUR CONTROL

Most effective equipment for refining cupola metal with soda ash is the Whiting U-ladle. It operates continuously, removing 20% to 40% of the sulphur and entrained oxide impurities within the time limits and temperature losses allowable. Metal thus treated has improved fluidity and pouring qualities as well as better analysis.

WHITING CORPORATION

15607 Lathrop Ave. Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis. Agents in other principal cities

WHITING
CORPORATION
MELTING CONTROL EQUIPMENT

Maximum Prices Set On Brass Ingot

Maximum prices for special "trade name" brass and bronze alloy ingots which are produced by persons other than those considered in the trade as ingot makers and which customarily sell at higher prices than regular ingots, have been established by OPA, Washington, at their maximum offering prices in carload lots in effect March 31, 1942, less 10 per cent.

This brings their prices into a proper relationship with those for regular ingots established Aug. 19, 1942, in maximum price regulation No. 202 (Brass and Bronze Alloy Ingot). That regulation reduced regular ingot prices approximately 10 per cent below March levels.

The ceilings for special ingots are established in amendment No. 1 to maximum price regulation No. 202 and the amendment is retroactively effective to Aug. 19.

Special "trade name" ingots are made by foundries, rather than the regular ingot manufacturers and play a vital role in the war effort. They are used in aircraft manufacture, particularly in aircraft engine bearings.

Pamphlet Discusses Metal Problems

"Metalurgency," a two-color 16-page pamphlet discussing all phases of the metals emergency confronted by Army Ordnance, recently has been published.

Produced under direction of Maj. Gen. L. H. Campbell Jr., chief of ordnance, it follows publication two months ago of "Tremendous Trifles," a booklet outlining the Army Ordnance redesign and conversion program.

The pamphlet briefly points out the stringent need of critical metals, outlines problems confronted, and urges intensive thought and research by industry toward their solution.

Two pages are devoted to NE steels, with several examples of their use. New manufacturing methods are discussed specifically. Heat treating is covered; opportunities for redesign are portrayed with two practical examples, and constant review of a specification for potential savings is recommended.

Book Review

Elementary Metallurgy, by W. T. Frier, fabrikoid, 207 pages, 5½ x 8 inches, published by McGraw Hill Book Co., New York, price $1.75.

This text book is designed to acquaint students in technical institutes, war production courses, etc., with the rudiments of metallurgy so that they can better understand the characteristics of the metals and alloys they are handling.

The book is divided into twelve chapters of which the first three describe the general features of producing iron and steel. The fourth chapter discusses methods of forming metals while chapters five and six are concerned with the constitution diagrams and the iron-iron carbide system. Heat treatment of steel is described in chapters seven and eight, and chapter nine relates to the grain structure of metals. Alloy steels, nonferrous metals, and testing of metals are the subjects discussed in the remaining chapters of the volume.

The office of the chief of foundry equipment and supplies, tools division, War Production Board, has been moved to 5517 Railroad Retirement Building, Washington. The telephone number remains the same, Republic 7500, extension 4081.

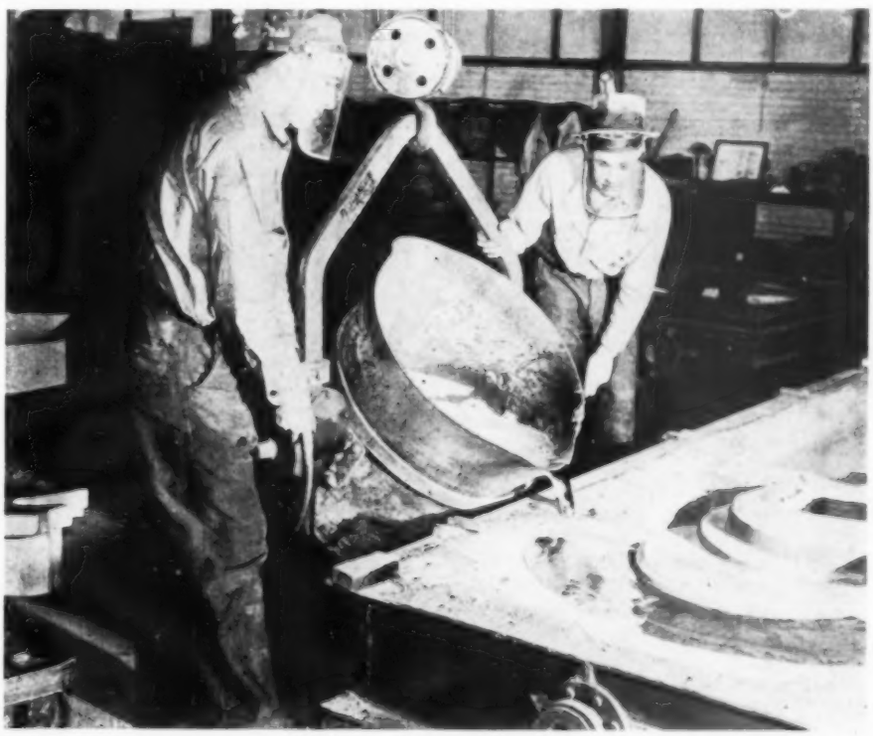
Seeks Inspectors

United States Civil Service Commission, Washington, is seeking materials inspectors for service with the United States Maritime Commission. Persons with industrial experience in the manufacture of metal, wood, glass and other articles are sought. Inspection must be made at place of manufacture and at point of delivery of metals, metal products, mechanical equipment, electrical equipment, stainless steel, and a variety of portable mechanical equipment, machinery or instruments.

Midwest Foundry Supply Co. has moved its office and warehouse to 270 West Union street, Edwardsville, Ill. The building is a two-story brick structure with capacity for storing 30 carloads of foundry and patternshop materials and supplies. T. C. Hamlin and Walter Zies are owners, and T. C. Hamlin Jr., is secretary and sales manager.

Zinc-base Dies Cast in Open Sand Molds

The airplane industry is a large user of aluminum and magnesium sheet shapes formed in zinc-base dies mounted in drop hammers and presses. The dies formerly made of straight zinc now are made of a special zinc alloy containing aluminum, copper and magnesium which is said to have higher tensile strength and hardness, casts well in sand giving clean, bright, smooth surfaces, and produces 10 to 50 times as many stampings as straight zinc. The dies are made in open sand molds as shown in the accompanying illustration. Molds usually are gated with a horn gate to bring the metal quietly into the cavity at the bottom. After the mold is fairly well filled, the remaining metal is poured directly into the cavity. After the metal has set, the face is leveled off by application of an oxyacetylene torch using a reducing flame and large tip. Photo is presented through courtesy of the New Jersey Zinc Co., New York.



activities of foundry groups

Metropolitan

SYNTHETIC sand made by mixing coarse and fine washed silica sands and bonding with bentonite which is regularly used in the Wright Aeronautical Corp. foundries was described by W. F. Rose, chief of sand laboratories, in addressing a group of 70 members and guests at the regular monthly meeting of the Metropolitan Chapter of the A.F.A. held Nov. 2 at the Essex House, Newark, N. J. W. G. Reichert, general foundry metallurgist, American Brake Shoe & Foundry Co., Mahwah, N. J., served as technical chairman.

Mr. Rose gave the properties of the synthetic sand to be 50 to 60 green permeability and 7 to 9 pounds per square inch green compressive strength at 5 per cent moisture content; dry compressive strength was given as 35 to 40 pounds per square inch. Among the advantages claimed for synthetic over natural sand were less brittleness in the green condition, lower moisture content required and adaptability to reclamation. The speaker said that reclamation was found to be profitable through conserving sand, binder and inhibitor. The two most important questions to consider when installing reclamation equipment are: How good a reclamation job is desired; at what rate is the sand to be reclaimed. The sand system used by the Wright Aeronautical Corp. consists of shaking out the molds over a screen, passing the sand over a magnetic pulley and into a revolving screen where the warm sand is cascaded and aerated. It then goes to a storage hopper from which it is removed in the order stored, passes through a vibrating screen and over a magnetic pulley to the mixing equipment, where necessary additions are made before the sand is ready for use. Two to 4 per cent new sand is required each day, the make-up sand being of the same grain size as the heap sand.

Mr. Rose indicated his preference for the use of synthetic sand for both ferrous and nonferrous castings. Two grades of washed silica sand with bentonite and cereal binder will fill most requirements. He stressed the importance of proper mulling and suggested that the most efficient mulling time be established by sampling the sand at minute intervals and testing for essential properties.

Illustrative of the sand which might be used by a small electric furnace steel foundry he recommended the use of a washed pure silica sand with bentonite and cereal binders to secure green compressive strength of 6 to 8 pounds per square inch and permeability of 90 to 125 with the moisture held as low as possible. This sand should be mulled, aerated and hard rammed in molding. For general iron and steel requirements a synthetic sand with a green permeability of 275 was recommended. This sand incorporated the use of sea coal with the molds being blacked and skin dried. Mr. Rose emphasized the importance of sand testing, saying that the more consistent the sand, the more uniform the product obtained. It is his recommendation that moisture content of every batch of sand used be checked.

The speaker told of the Wright foundry's success in reclaiming core sands through calcination wnica removes from sand all carbonaceous materials and apparently leaves it in as good, if not in better condition, than when first used. They have found the ore type of roaster to be the best for this service. The cost of calcination is approximately $1.00 per ton of sand.

Next meeting of the Metropolitan Chapter will be Dec. 7, and will feature Sam Tour, Lucius Pitkin Inc., who will speak on "Substitutes for Critical Foundry Alloys."—*K. A. DeLonge, secretary.*

Michiana

SEVENTY regulars of the Michiana Chapter of the A. F. A. were present at Hotel LaSalle, South Bend, Ind., Nov. 4, to welcome Martin J. Lefler, Western Foundry Co., Chicago, who was the chapter's first president. Mr. Lefler spoke of the problems he had encountered in converting a gray iron foundry to steel, including not only the required changes and additions to existing patterns and equipment, but the problem of training men to handle an unfamiliar metal. The talk was followed by a lengthy question and answer session, in which the speaker related his experience on specific points raised by the members. Mr. Lefler's talk included a description and comments on the triplex method of preparing steel, as well as comments on the use of the converter alone following the cupola

H. Klouman, Michiana Products Co., Michigan City, Ind., and chairman of the chapter, announced the appointment of R. F. Patterson, Elkhart Foundry & Machine Co., to act as chairman of the war problems committee, assisted by J. E. Drain, Oliver Farm Equipment Co., on malleable and gray iron; Herman Hess, Clark Equipment Co., on steel; A. T. Ruppe, Bendix Products Division, on magnesium, aluminum and brass; and Dr. E. G. Mahin, University of Notre Dame, in an advisory capacity on all problems. Chairman Klouman also announced the appointment of the regular committee chairmen, as follows: Carl W. Petersen, Dodge Mfg. Corp., program; Joseph Brajcki, Bendix Products Division, membership; V. C. Bruce, Buckeye Products Co., entertainment; and Leonard F. Tucker, City Pattern Works, publicity. Members of the chapter are urged to consult with the war problems committee in solving difficulties encountered in filling war contracts. Movies of the September outing were shown.

Next meeting of the chapter will be held Dec. 1, Hotel LaSalle, South Bend. —*L. L. Andrus, secretary-treasurer.*

Northern California

MEMBERS and friends of the Northern California Chapter of the A.F.A. responded well to the call to come to the "Pattern Makers" program Oct. 9. The meeting was held at the Athens Club, Oakland, with 84 present, including several pattern shop operators who had never attended before, as well as a number of journeymen pattern makers. All enjoyed the program and benefited by the excellent discussion which E. T. Kindt, Kindt-Collins Co., Cleveland, presented under the sponsorship of the Chamberlain Co., the company's local representative.

Mr. Kindt illustrated his talk with photographs and cuts as well as a series of standard slides in addition to running 1500 feet of motion pictures. His detailed introduction to the pictures covered kinds and grades of pattern lumber, how his firm selects and treats it, the lumber's seasoning process, care and storage against absorbtion or moisture, and humidity control used in certain large pattern shops to preserve the accuracy necessary for the foundry to produce perfect castings in quantity for the heavy demand being made on it by the war industries.

The speaker explained many machines now in use by up-to-date pattern shops to eliminate much hand labor and to produce the intricate work which they are called upon to make. He also explained and later showed pictures of different types of core making and molding machines and equipment.

Chairman of the chapter, Fred A. Mainzer, Pacific Brass Foundry, San Francisco, presided and called attention

(*Continued on page* 128)

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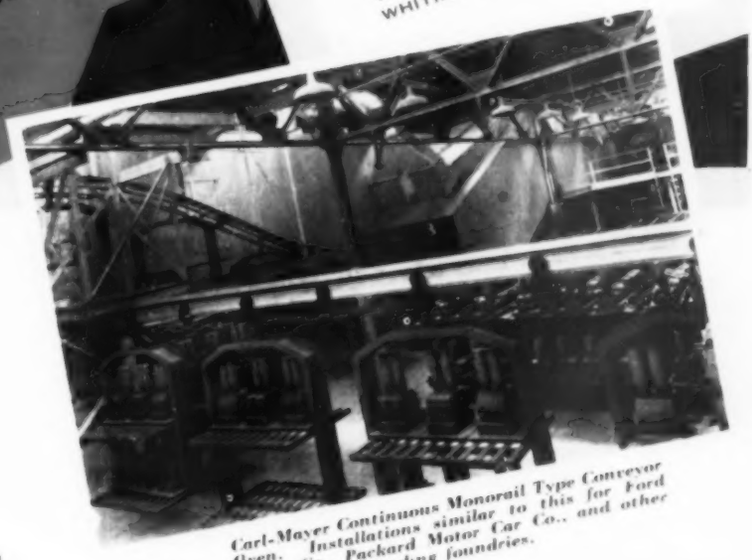

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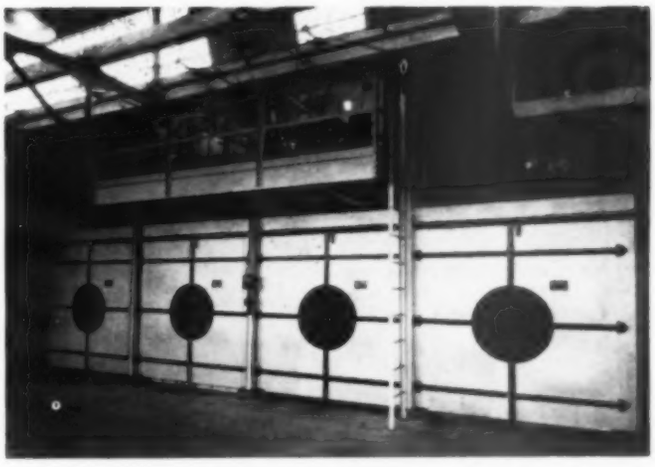

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(*Continued from page* 126)

to the form letter mailed with the program explaining the maintenance of membership for those men going into the service.—*George L. Kennard, secretary-treasurer.*

Philadelphia

FIRST meeting of the current season of the Philadelphia Chapter of the A.F.A. was held at the Engineers Club, Oct. 9, with 125 members and guests in attendance. Chairman, D. J. Peake, Florence Pipe Foundry & Machine Co., presided. After an address of welcome, he introduced Chief Boatswain's Mate Robinson of the United States Navy who presented three very inspiring motion pictures entitled: "Eyes of the Navy," "American Sea Power", and "I Am the American Blue Jacket", which showed the extensive training given by the Navy to aviation cadets.

John A. Sweeney, Florence Pipe Foundry & Machine Co., technical chairman, presented the main speaker, Emile Pragoff Jr., Hercules Powder Co., Wilmington, Del. His subject covered core baking and theory and practice. With the aid of charts and blackboard illustrations, Mr. Pragoff pointed out the best baking temperatures of sands with various types of binders. He also explained the work his company was doing in endeavoring to secure accurate information regarding the effect of temperatures on different types of sands. At the completion of his talk, Mr. Pragoff answered many questions submitted by the members and guests.—*William S. Thomas, chairman, publicity committee.*

Quad-City

SEPTEMBER meeting of the Quad-City Chapter of the A.F.A. and the first session of the current season of activities was held at the Hotel Blackhawk, Davenport, Iowa, Sept. 21. There were 66 present for meeting. W. E. Jones, Ordnance Steel Foundry Co., Bettendorf, Iowa and vice chairman of the chapter presided. The war problems committee, national cupola committee and the membership committee were appointed.

N. J. Dunbeck, vice president, Eastern Clay Products Co., Eifort, O., was the main speaker for the evening. His topic was, "How To Select a Bond Clay". His interesting discussion covered the various types of clays with the applications in which each could be used in the foundry industry. The composition of minerals was given since that factor determines its use in the foundry. Brief discussion was made in regard to the deposits in the United States and the particular characteristics of each as to its location. An interesting session of questions and answers was conducted after the talk.

Alex Matheson, French & Hecht Inc., Davenport, Iowa, and chairman of the chapter, presided at the October meeting of the Quad-City Chapter of the A.F.A. which was held at the Fort Armstrong Hotel, Rock Island, Ill., Oct. 19. Ninety-five members and guests were present.

Zigmond Madacey, core room foreman, Caterpillar Tractor Co., Peoria, Ill., was the principal speaker. His topic, "Core Blowing" was illustrated with examples of methods which can be used in making cores. Discussion on methods covered such factors as accurate sand control, sand drying facilities, co-operation of various departments, qualified operators with skill in handling machines and moisture mixes. An interesting question period was the result of the excellent talk by Mr. Madacey with many problems that the various core room men had in their operations being discussed.—*J. Morgan Johnson, secretary-treasurer.*

Birmingham

INITIAL meeting of the Birmingham District Chapter of the A.F.A. for the year 1942-43 was held at the Tutwiler Hotel, Oct. 16, with a large attendance. Temporary secretary, W. J. Bach, announced the personnel of the various committees to serve during the year.

Chairman Holberg of the membership committee read the following names as new members: W. J. Bach, Foundries Service Co.; Caldwell Foundry & Machine Co.; H. L. Mize and W. B. Sommers, Goslin-Birmingham Co.; L. E. Greer Jr., Thomas Foundries Inc.; Ben Tyus, Caldwell Foundry & Machine Co.; Harvey L. Julian, American Cast Iron Pipe Co.

The general subject of "Raw Materials from Procurement Angle" was discussed well by Warren Whitney from the viewpoint of the production foundry; C. P. Caldwell dealt with the subject from the steel foundry viewpoint; and Charles Wegelin covered it from the nonferrous foundry angle. Round table discussion followed the presentation of each of the discussions of the general subject, and much interest was manifested in this important problem affecting the foundry industry.—*H. B. McLaurine, publicity chairman.*

Central Indiana

APPROXIMATELY 125 members and guests of the Central Indiana Chapter of the A.F.A. were present at the Nov. 2 meeting of the chapter held at the Washington Hotel, Indianapolis. B. P. Mulcahy, Citizens Gas & Coke Utility, Indianapolis, and chairman of the chapter presided, and Gene Smith, Eugene W. Smith Inc., Evansville, Ind., served as technical chairman. Principal speaker was Harry W. Dietert, Harry W. Dietert Co., Detroit, whose discussion was entitled, "Behavior of Sand and Cores in the Mold at Pouring Temperatures". The subject was illustrated by a color motion picture film depicting the behavior of both sand and cores at elevated temperatures. The casting defects were shown and the behavior of the sand at pouring temperatures; then a view of the sand or core that corrected the defects was illustrated.

Selection of molding equipment will be the subject discussed by M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill., at the Central Indiana Chapter's Dec. 7 meeting.—*Ralph A. Thompson, secretary.*

St. Louis

ORDNANCE casting specifications were described by Carl H. Morken, Carondelet Foundry Co., St. Louis, and consultant, Office of the Chief of Ordnance, Washington, at the Oct. 8 meeting of the St. Louis District Chapter of the A.F.A. held at the Desoto Hotel, St. Louis.

The meeting was opened by Chairman C. B. Shanley, Semi-Steel Casting Co., who announced that all members called into the armed services are to be carried on the rolls of the association as active members. Prizes to the three winners in last year's apprentice patternmakers course were awarded. Following the introduction of several new members, Chairman Shanley introduced Mr. Morken. He had originally intended to speak on the cooling reactions of cast iron, but by consent of the members, discussed ordnance casting specifications and related interests encountered in his duties as consulting engineer in the ordnance department. His talk was well received and brought forth considerable discussion on ordnance requirements of steel, iron and nonferrous foundries.

The meeting was concluded with three reels of war front news which proved exceedingly interesting.—*J. H. Williamson, secretary-treasurer.*

Pittsburgh

FUNCTION of the foundries in the job being done by the ordnance department was outlined by Maj. Harold G. Garvis, chief of the Tank Branch, Pittsburgh Ordnance District, at the October meeting of the Pittsburgh Foundrymen's Association. Major Garvis brought up to date the organization of the ordnance department, the job it has to do, and what it has required of the foundries thus far in the war effort. Possibilities of new developments in the future also were touched upon, although quite generally. Chief among these is a definite increase in physical requirements on all castings with the probable decline in the availability of alloys, with a similar increase in the heat treating requirements.

Major Garvis held little hope for the gray iron foundrymen, indicating that the major effort will continue to be in steel, with gray iron playing only the role of a fringe supplier on incidental parts. The tank program particularly will call for an increased volume of steel castings of unusual size and shape and difficult physical requirements.

The Pittsburgh office of the Industrial Salvage Section, War Production Board,

(*Continued on page* 130)

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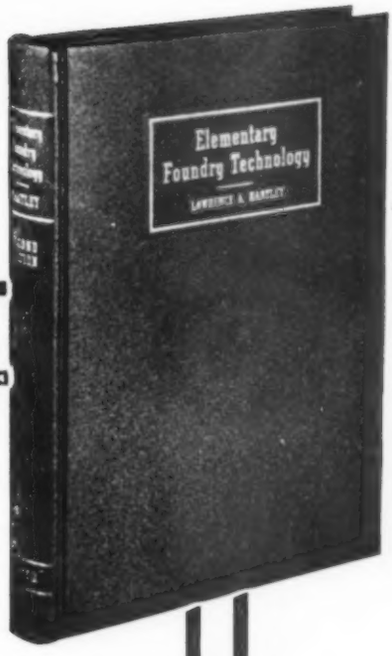

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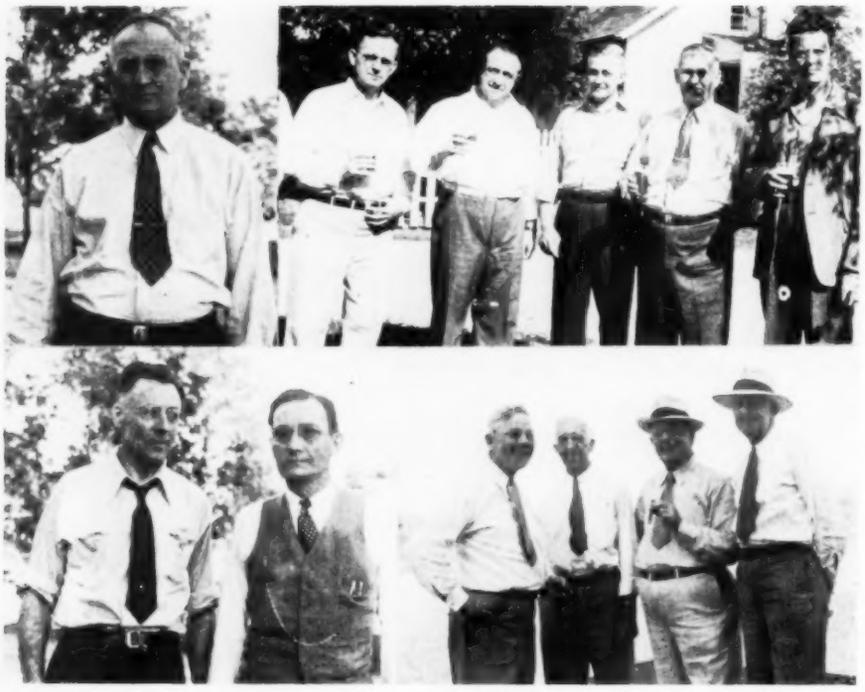

Fourth annual picnic of the Western New York Chapter of the A.F.A. was held at Kudara's Farm. Illustrations are presented through the courtesy of Robert K. Glass, Republic Steel Corp., Buffalo

(*Continued from page* 128)

showed by means of a sound slide film the organization of this important branch in its function of gathering scrap from industry. Representatives of the section now are calling on all foundries in the Pittsburgh district to set up definite salvage programs and increase the flow of our most critical raw material—scrap.

Attendance was the highest at any technical session of the association in many years, numbering over 160 members and guests.—*R. L. Hartford.*

Western New York

BEHAVIOR of molding sand and cores at elevated temperatures was the subject discussed at the Nov. 6 meeting of the Western New York Chapter of the A. F. A. which was held at Hotel Touraine, Buffalo. Ralph T. Rycroft, Jewell Alloy & Malleable Co., Buffalo, and chairman of the chapter, presided. Over 110 members and guests attended.

Harry W. Dietert, Harry W. Dietert Co., Detroit, was the speaker and he presented a film giving latest information relative to the behavior of molding sand and cores at elevated temperatures. The pictures showed clearly the action that takes place in the mold between sand and cores. One film illustrated breakdown and was followed by another film giving data regarding controlling hot strength through the additions of iron oxides. Mr. Dietert supplemented the showing of the films with a running talk on the highlights of the subject. An interesting discussion period followed.

Chairman Rycroft told the members of a new series of meetings to be held in Buffalo in connection with the War Production Board at which every technical society will be represented to handle war problems. An announcement was made of the death of one of the esteemed local foundrymen, John Gaffney, one of the real old-time foundrymen. The Western New York Chapter will journey to Rochester, N. Y., in February to hold its monthly meeting with all the foundrymen of that district. Speaker's name and subject will be announced later. The chapter's annual stag party will be held in Buffalo, Saturday evening, Jan. 9. Walter Crafts, Carbide & Carbon Chemicals Corp., Niagara Falls, N. Y., will discuss "Deoxidizers for Cast Steel" at the Dec. 4 meeting to be held at Hotel Touraine, Buffalo.—*J. R. Wark, secretary.*

E. Canada - Newfoundland

FIRST general meeting of the Eastern Canada and Newfoundland Chapter of the A.F.A. was held at Mount Royal Hotel, Montreal, Oct. 21. Chairman C. C. Brisbois, Robert Mitchell Co. Ltd., welcomed the new members to the association.

Principal speaker of the meeting was Pat Dwyer, engineering editor of THE FOUNDRY. Mr. Dwyer who was born in Ireland and came to Canada in 1885, started his apprenticeship with I. Matheson & Co., New Glasgow, N. S., and has devoted his life to the problems of foundrymen. He capably handled his subject, "Importance of Gates and Risers in the Successful Production of Castings". This was enlarged upon at some length and lantern slides shown. Some questions were presented by the members and solutions to their problems were explained by the speaker.

Approximately 140 members and guests were present at the meeting, and Chairman Brisbois expressed his pleasure at seeing such a large gathering. He listed the following meetings to be held at the Mount Royal Hotel and said that arrangements had been made by the program committee for a number of interesting subjects: Dec. 19, Jan. 21, Feb. 18, March 18, and April 15. Roger Keeley, chief metallurgist, Ajax Metal Co., Philadelphia, will be the speaker at the Dec. 18 meeting and his subject will be "The Use of Silicon Bronzes in the Conservation of Tin".—*Robert E. Cameron.*

Cincinnati

DISCUSSION of general present day core conditions in the foundry, and methods of core blowing featured to Oct. 12 meeting of the Cincinnati District Chapter of the A.F.A. held at the Cincinnati Club. Frank E. Hutchinson, Reliance Foundry Co., Cincinnati, and chairman of the chapter presided.

Following presentation of committee reports, Herman K. Ewig, Cincinnati Milling Machine Co., introduced M. J. Gregory, and Zigmond Madacey, Caterpillar Tractor Co., Peoria, Ill., who were the speakers of the meeting. Mr. Gregory's discussion covered such subjects as apprentices, upgrading and training workers, and substitutions for alloys and scrap in the cupola charges. Mr. Madacey's talk was on core blowing which he illustrated with slides. He had also an exhibit of core boxes and cores. A spirited discussion concluded the meeting.—*Henry M. Wood, secretary.*

Ontario

EMPLOYER-EMPLOYE relationships have taken on new importance in the foundry industry as a result of wartime conditions. The situation has changed rapidly and whereas raw materials and production methods were the first concern less than a year ago, the business of getting along with employes seems to rank as tops today.

Choice of B. A. Trestrail, personnel director, John Inglis Co. as the speaker at the first meeting of the season of Ontario Chapter of the A.F.A. at Hamilton, Ont., on Sept. 25, met with the hearty approval of foundrymen and resulted in an attendance of approximately 125 people. Mr. Trestrail pointed out that one of the biggest problems facing industry today results from the enormous expansion in the number of employes in many plants and the large labor turnover which has existed in many cases. Because of this tremendous change in personnel, it is not easy to plan sound employer-employe relationship. However, experience with large numbers of workers has shown that if a plan is sound, sensible, and simple, the majority will accept it readily. The better the organization worked out to put into effect

any plan, the better the results obtained.

An instance of the way in which workers will respond to sound organization was the selling of bonds during the last Victory Loan campaign. In most cases where employes are allowed to decide, they get whole-heartedly behind such a plan. The result of sales of Victory Loan bonds in Canada through the formation of an "Employe Plan" was electrifying, with some $65,000,000 sold to workers at wages below $3000 per year, against a total of $12,000,000 in the previous campaign. Employe committees tend to give employes a new appreciation of the importance of doing their part. Such committees can do excellent service in dealing with problems of health, hygiene, safety, absenteeism, etc.

Absenteeism is one of the greatest problems of industry today, not only in Canada and the United States, but also in England. Part of this difficulty arises from the fact that the great expansion of companies has resulted in a deterioration of the company spirit and loyalties which formerly bound many employes to their work. One of the best solutions to absenteeism is to pass the problem over to the employes themselves in the form of a drive or campaign. Starting with units of about 15 employes, each with a leader, an organization is built up under which the employes themselves check into cases of absenteeism. Giant thermometers and score boards are employed with this plan, showing the loss of production due to absenteeism and the improvement being made.

Through an analysis of thousands of slips given out on which reasons are given anonymously for absenteeism, a real picture of the situation can be obtained. Each of the steps in the general program does something toward reducing absenteeism and at the plant of John Inglis Co. Ltd. a cut of 30 per cent of lost time was effected within a few weeks of the commencement of the program. Once reasons for absenteeism are unearthed, a realistic attempt must be made to remove as many of the causes as possible. For instance, it is found that many girls stay away from work in order to go shopping. Therefore, an attempt is being made to arrange in some way for shopping hours which will not interfere with their work. Another reason frequently given for absenteeism is a visit to relatives or friends out of town by workers who become lonely away from home. To counteract this difficulty, the John Inglis company is opening a recreation club for its girl employes which will be open 24 hours a day, 7 days a week. Slowly but surely, through such methods, a company builds in its employes an understanding of its sincerity in meeting their needs.

The formation of plant co-operation committees has shown excellent results. Committees do not make decisions in regard to production, but no major policy change is made in a company without consulting them. Many good suggestions come from the workers on these committees and thus a better spirit results between employer and employe. J. J. McFadyen, Galt Malleable Iron Co. Ltd., Galt, Ont., and chairman of the chapter, presided.—*G. L. White, secretary-treasurer.*

Chicago

AN ATTRACTIVE group of round-table discussions, the popularity of the new dining and meeting facilities at the Chicago Bar Association, and the announced determination of officers that meetings will be conducted on precise schedules, operated together to bring out over 250 members and guests to the Nov. 2 meeting of the Chicago Chapter of the A. F. A. This attendance was the best in recent years, and forecasts that the greater interest in foundry problems under war conditions probably will be sustained throughout the year.

Chapter Chairman A. G. Gierach, works manager, American Manganese Steel Co., Chicago Heights, Ill., presided at the dinner, and Max F. Becker, vice president, Whiting Corp., Harvey, Ill., chapter vice chairman and chairman of the program committee, handled the technical activities. The evening's program consisted of five roundtable discussions conducted by the steel, gray iron, malleable, nonferrous and pattern divisions.

A. W. Gregg, Whiting Corp., Harvey, Ill., was discussion leader at the steel session, which considered "Melting Steel by the Triplex Method." H. A. Forsberg, Continental Roll & Steel Foundry Co., East Chicago, Ind., presided. Following a 20-minute review of the triplex process by Mr. Gregg, discussion ensued freely. Although the process involves the cupola, converter and electric furnace, major attention centered on the converter, which is enjoying renewed favor after some 17 years descendency as a means for producing steel.

"Casting Defects—Causes and Cures" was the subject of the gray iron division, with A. S. Klopf, Hansell-Elcock Co., Chicago, officiating as chairman, and William A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee, as discussion leader.

L. J. Wise, Chicago Malleable Castings Co., Chicago, was both chairman and discussion leader at the malleable iron session. Topic was, "Effect of Scarcity of Preferred Melting Stock on Furnace Operations, Foundry Difficulties and Physical Properties of Malleable Iron." "Silicon Bronzes" was the subject for the nonferrous group, with H. M. St. John, Crane Co., Chicago, as discussion leader, and Chester Faunt, Christensen & Olson Foundry Co., Chicago, the chairman.

Those attending the roundtable of the pattern division, newly organized this year, devoted their attention to "Apprentice Contest Patterns." With H. J. Swanson, Swanson Pattern & Model Works, Hammond, Ind., as chairman, discussion was led by Edward Sabey, Miehle Printing Press Co., Chicago, and Lave Gustafson, Continental Roll & Steel Foundry

The illustration at the left is of the officers of the Northern Illinois-Southern Wisconsin Chapter of the A.F.A. Reading from left to right are: R. W. Mattison, secretary and treasurer; Roy Basinger, vice chairman; Max Reuteler, chairman; and J. H. McIntyre, technical secretary. The illustration at the right shows Max Reuteler, Fairbanks, Morse & Co., Beloit, Wis., and chairman of the chapter with Duncan Forbes, Gunite Foundries Corp., Rockford, Ill., and president of the A.F.A. Photographs courtesy of John Bing, A. P. Green Fire Brick Co., Milwaukee

Co., East Chicago, Ind. Patterns made by apprentices in 1941 were examined and considered as to moldability, accuracy and partings. Core boxes also came in for discussion.

The Dec. 7 meeting of the chapter will feature A. R. Blackburn, research engineer, Ohio Experimental Station, Columbus, O., as the principal speaker, on the subject, "Chemistry of Refractories."

Chicago chapter has organized a War Problems Committee to assist members and foundrymen of the Chicago area generally on all problems of a technical or general nature relating to the production of castings, excluding wage-hour matters and labor relations.

The committee includes members from the several divisions of the industry—gray iron, steel, malleable, brass, bronze, aluminum, magnesium—and its primary purpose is to clarify and expedite any situation hampering the war effort as foundrymen. The committee will act in this same capacity for the local ordnance, WPB and navy officers.

E. R. Young, Climax Molybdenum Co., is chairman of the committee; L. L. Henkel, War Production Board, is vice chairman; and Norman F. Hindle, American Foundrymen's Association, 222 West Adams street, Chicago, is secretary.

Other members of the committee are: *Steel*, L. H. Hahn, Sivyer Steel Casting Co., F. S. Sutherland, Continental Roll & Steel Foundry Co.; *Cast Iron*, John H. Gellert, Nichol-Straight Foundry Co., L. H. Rudesill, Griffin Wheel Co.; *Malleable*, W. D. McMillan, International Harvester Co., Leon J. Wise, Chicago Malleable Castings Co.; *Brass and Bronze*, Chester K. Faunt, Christensen & Olsen Foundry Co., H. M. St. John, Crane Co.; *Aluminum*, George H. Starman, Apex Smelting Co.; and *Magnesium*, Gordon H. Curtis, Dodge Chicago plant, Chrysler Corp.—*E. F. Ross.*

Chesapeake

TECHNICAL sessions of the Chesapeake Chapter of the A.F.A. held at the Engineers Club, Baltimore, Md., Oct. 23, featured R. G. McElwee, Vanadium Corp. of America. J. E. Crown, Naval Gun Factory, Washington, and chairman of the chapter, presided over the meeting at which more than 100 members and guests were present. Mr. McElwee's subject, "Making Every Ounce Count" covered many points of interest to all foundrymen, mainly that of economy as well as precision in obtaining uniform results in the final product.

He emphasized very strongly that cast iron is not a single alloy but a series of alloys that have to be made up according to section thickness. Sections varying from ¼-inch to 8 inches definitely entail a wide series of analyses. He also spoke of late inoculations to a weak iron to bring the material up to the desired physical characteristics. These late inoculations act not only because of their deoxidizing characteristics but also because of their homogenizing qualities. Charts were shown to illustrate the fact that although chrome itself may be a carbide stabilizer, late additions containing chrome and silicon will actually reduce chill and impart strength. He also pointed out that there is a vast difference between a sound test bar and an ultimate sound casting.

J. H. Cochrane, Cochrane Brass Foundry, York, Pa., created considerable interest among the members by bringing to the meeting a brass casting which showed a gaseous condition. After explaining the way the casting was made, the analysis of the metal and all other details, he asked for a solution to the trouble. There were many solutions offered by those present, and at least Mr. Cochrane received a variety of suggestions, which may be of value to him. Problems of this nature are invited and it is anticipated that others will follow Mr. Cochrane's idea.

Next regular meeting of the chapter will be held Dec. 4, at the Engineers' club, Baltimore. The speaker for the evening will be Harry W. Dietert, Harry W. Dietert Co., Detroit, an authority on foundry sand testing, grading and laboratory equipment.—*Frederick Bruggman.*

Members of the Chesapeake Chapter held an interesting discussion of casting problems at their recent meeting. Photographs courtesy of Frederick K. Bruggman, Industrial Supply Corp., Baltimore

Detroit

INITIAL regular meeting of the current season for the Detroit Chapter of the A.F.A. was held Oct. 15. One of the largest turnouts in recent chapter history, with 135 in attendance at the Rackham Educational Memorial was on hand for the meeting.

The chapter has adopted a new meeting technique this year, arranging four simultaneous round table discussions, held in separate rooms, and on different phases of foundry practice. At the October meeting, the subjects were steel, aluminum, magnesium, and brass-bronze. The round-table discussions are started off with a brief introduction presented by a discussion leader, after which questions and discussion keep the meeting moving at a lively pace. Discussion leaders were: For steel, R. J. Wilcox, Michigan Steel Casting Co.; for magnesium, A. W. Winston, Dowmetal Foundry Division, Dow Chemical Co.; for aluminum, P. C. Beck, Aluminum Co. of America; and for brass-bronze, Stuart G. Fitzpatrick, U. S. Reduction Co.

Following dinner the crowd divided into four groups, with approximately the same number in each, and retired to the four meeting rooms for the discussion period. The arrangement proved highly successful, thanks to the efforts of the group chairmen for the roundtables. They were: C. E. Silver, Michigan Steel Casting Co.; A. W. Stolzenberg, Aluminum Co. of America; J. P. Carritte Jr., True Alloys Inc.—*A. H. Allen, secretary.*

Connecticut Nonferrous

OCTOBER meeting of the Connecticut Nonferrous Foundrymen's Association was held at Hotel Garde, New Haven, Conn. The evening featured a round table discussion of war casting problems. The discussion was led by a committee which included: Joseph Shannon, Charles A. H. Knapp, S. W. Chappell, and Ernest F. Stone. There was a large attendance and nearly all present entered into the discussion.

A member of the W.P.B. Crucible Branch will be the speaker at the association's Dec. 16 meeting which will be held at Hotel Garde, New Haven, Conn. —*Louis G. Tarantino, secretary.*

Northeastern Ohio

OVER 150 members and guests were present at the regular monthly meeting held at the Cleveland Club, Cleveland, on Nov. 12. Previous to the meeting from 4 to 6 p.m., the members visited Case School of Applied Science and made a tour under student guidance to the foundry department, and various laboratories operated in connection with engineering education. The visitors were impressed very favorably with the wide scope of activities and work conducted at Case, and appreciated greatly the cooperation of the officials in making the tour possible.

Following the visit to the school the members and guests adjourned to the Cleveland Club for dinner. At the close of the dinner President Tressler called attention to the A.F.A. essay contest He then introduced a number of men from Case School of Applied Science faculty who were present and included Professors Vose, Donaldson, Prutton, Wierton, and Carson, and Messrs. Hudec and Smith. Mr. Tressler announced appointees on the War Problems committee, and then introduced Robert E. Kennedy, national secretary, who spoke briefly on functions of the War Problems committee, and the work of the Cupola Research committee. Coffee talk was presented by Ray Ride, director of athletics, and football coach of Case School.

Mr. Ride described various offensive and defensive tactics employed in football, and showed colored motion pictures of the recent Case-Carnegie Tech game which was won by Case.

Dr. William E. Wickenden, president of Case School, and noted authority on engineering education, presented the main address of the meeting, and spoke on "Engineering Training and the Foundry Industry". He pointed out that approximately 35,000 freshmen entered engineering schools each year, but only 12,000 were graduated. He said that the normal engineering training is not designed to provide a specific, practical training because the field is too broad to cover in the limited period of the usual 4-year course. The aim rather is to give the student a sound understanding of the underlying, basic principles. One reason for that is because it is not possible to determine the particular aptitude and capability of a student until he reaches his final year of training. Activities and training in engineering are designed to develop the student as a thinker and worker, to implant his mind with scientific facts, and fit him to cope with life.

Dr. Wickenden said that one method of bringing closer co-operation between industry and the college is for industry to provide research problems which use the college facilities. Also industry should make known to the college officials its wants for graduates. In closing he said he believed that not more than 50,000 out of the 800,000 male students now in colleges and universities would be deferred for industrial demands. He also drew attention to the need of considering post war conditions, pointing out that if all energies are directed to increasing production to a point where debt becomes insignificant, this country will not have a depression.

The War Problems committee of the Northeastern Ohio Chapter appointed at the meeting is as follows: *Gray iron*—A. C. Denison, Fulton Foundry & Machine Co., Cleveland; Frank J. Dost, Sterling Foundry Co., Wellington, O.; William J. Feth, Forest City Foundries Co., Cleveland. *Malleable iron*—Fred A. Stewart, National Malleable & Steel Castings Co., Cleveland; James H. Lansing, Malleable Founders' Society, Cleveland; J. J. Witenhafer, Lake City Malleable Co., Cleveland. *Steel castings*—Ralph R. West, West Steel Castings Co., Cleveland; John Trantin Jr., Youngstown Alloy Casting Corp., Youngstown, O.; Charles W. Briggs, Steel Founders' Society of America, Cleveland. *Brass and Bronze*—E. F. Hess, Ohio Injector Co., Wadsworth, O.; G. L. Bierly, Mansfield Brass Foundry Inc., Mansfield, O. *Aluminum and Magnesium*—Fred S. Wellman, Wellman Bronze & Aluminum Co., Cleveland; H. C. Nicholas, Quality Castings Co., Orville, O.; H. J. Rowe, Aluminum Co. of America, Cleveland. *Patterns*—J. V. Brost, Brost Pattern & Casting Co., Cleveland; M. E. Kohler, Scientific Cast Products Corp., Cleveland; J. S. Parker, Motor Patterns Co., Cleveland. *Pig iron*—T. G. Johnston, Republic Steel Corp., Cleveland; A. D. Smith Jr., Bethlehem Steel Co., Cleveland; William Ramsey, Pickands, Mather & Co., Cleveland. *Cupola Operation*—W. O. Larson, W. O. Larson Foundry Co., Grafton, O.; W. C. Manwell, Fulton Foundry & Machine Co., Cleveland; Milton Tilley, National Malleable & Steel Castings Co., Cleveland. *Core Production*—Elmer Zirzow, National Malleable & Steel Castings Co., Cleveland; William Rayel, Werner G. Smith Co., Cleveland. Chairman—Frank G. Steinebach, THE FOUNDRY, Cleveland.

The annual Christmas Party of the chapter will be held at the Hotel Carter, Cleveland, Thursday evening, Dec. 10.—*Edwin Bremer.*

New England

CASTINGS for ordnance material was the topic of discussion at the Oct. 14 meeting of the New England Foundrymen's Association held at the Engineer's Club, Boston. The guest speaker was Charles A McCarthy, superintendent of production, Watertown Arsenal.

After a brief introduction in which the speaker recalled the earlier meetings of the association which were addressed by such men as Dr. Moldenke, Bob Robinson, R. F. Harrington, and W. M. Saunders, he said that his company was now procuring all types of iron, steel and bronze castings, high strength and heat resisting castings together with various special purpose irons from jobbing foundries in the locality. The principal requirements for ordnance castings are precision, accuracy, and soundness. He congratulated the foundrymen on being able to produce consistently castings of physical characteristics that were thought impossible some years ago, and also on their ability to keep well up with the present demand.

In discussing steel castings, Mr. McCarthy said that the magnaflux method of inspection was a standard test at the arsenal in determining the fitness of the part. This method has helped greatly in eliminating hot tears, cracks, etc. Chills, their proper location and size, also help in keeping defective castings at a minimum.

Many progressive steps for saving castings as well as time and money, have been taken at the arsenal. As an example, he stated that all chips from machining operations are saved for the various classes of alloyed steels, separated, briquetted and returned to the proper melt in order to save alloys. The speaker emphasized the importance of proper welding of steel castings and showed how poor welding showed up under magnafluxing. Several slides illustrated this point. The importance of stress relieving after welding also was emphasized. X-ray is used where shrinkage cavities, blow holes, etc., are suspected in thick sections of castings.

The speaker approved the practice used by many companies in making a pilot casting and having it studied, examined and tested before going ahead on large size orders. At the conclusion of the address, many questions were asked and a general discussion followed. About 90 members and guests were present at the October meeting.

Regular monthly meeting of the New England Foundrymen's Association was held at the Engineers' Club, Boston, Nov. 11, with about 90 members and guests in attendance. President Raymond Meader, Whitin Machine Co., Whitinsville, Mass., presided.

After the dinner, Hans J. Theiler, textile engineer, Whitin Machine Co., Whitinsville, Mass., gave a most interesting coffee talk on Switzerland and the war. Mr. Theiler, who is a native of Switzerland, told why, in his opinion, his country had been able to keep out of the war so far and described wartime conditions which prevail there at present.

The principal speaker of the evening was John N. Ludwig Jr., Electro Metallurgical Co., New York, who spoke on, "The Role of Ferroalloys in Meeting

Speakers at the Oct. 16 meeting of the Wisconsin Chapter, reading from left to right are: Fred W. Hintze, Illinois Clay Products Co.; C. A. Sanders, American Colloid Co.; W. C. Simons and Carl Gallouer, War Production Board; and George K. Dreher, Ampco Metal Inc., president of the Wisconsin Chapter. Photograph courtesy of John Bing, A. P. Green Fire Brick Co., Milwaukee

War Emergency Conditions in Gray Iron Foundries". Mr. Ludwig, who has had considerable experience in the metallurgy of iron and steel, laid great stress on metallurgical control. He said that frequent standardized tests throughout a melt are better than breaking up a casting to look at it after the cast. Chill tests, machining tests, physical and chemical determinations are as much a part of good foundry procedure as are mixture calculations and proper foundry practice. Present wartime difficulties, such as not being able to get desired pig irons, or certain alloys, are inevitable and must be overcome by other means. This may mean closer control of cupola operations, more frequent chemical analysis of the melt, and periodic sulphur determinations on the coke used.

Many interesting slides were shown and the effect of chrome additions to iron illustrated by tables of physical properties obtained on such irons. He explained that irons having the same chrome content have less chill, better machinability and greater strengths when an alloy called SMZ is added in conjunction with the chrome. This alloy is one with balanced amounts of silicon, manganese and zirconium. After the address, there was a general questions and discussion period.—*M. A. Hosmer.*

Wisconsin

IN the present emergency, 4900 pounds of metal are required for every man in the armed forces of the country, whereas this ratio formerly was 90 pounds per man, according to William E. Simons, deputy regional salvage manager, War Production Board, who summarized the results of the recent scrap drive in an address before the Wisconsin Chapter of the A.F.A. at its meeting at the Hotel Schroeder, Milwaukee, on Oct. 16. This comparison, he said, emphasized the present urgent need of greater salvage efforts brought about by the highly mechanized warfare of the present day.

Mr. Simons described the organization throughout Wisconsin of permanent committees in each county to supervise the collection of industrial scrap. He urged manufacturers to greater efforts in providing the much needed industrial scrap. From Wisconsin's automobile grave yards alone, he reported, 7800 tons of scrap were gathered during September. He explained the financial set up provided for recovery of scrap where the removal cost exceeded current scrap prices.

Following Mr. Simons' talk, the meeting divided into sectional sessions—*George M. Pendergast, chairman, publicity committee.*

Scrap Table Helps Reduce Losses

For an object lesson to employes, the Caterpillar Tractor Co., Peoria, Ill., has set up a number of scrap tables in the various departments of the plant. The accompanying illustration shows the table in the foundry employe's service building. A card on each piece describes the character of the defect, the cause and the remedy. For example a card on the casting at the extreme left reads: Mold scab. May have been caused by improperly prepared sand, mold rammed too hard or mold not finished properly. Card on another item reads: Aluminum flask handle. A very vital war metal. Too many of these handles and flasks alike broken through careless handling or reckless driving on part of electric truckers. Other typical card readings (a) Core crushed in clamping mold. Man setting cope core should have seen crack in core. (b)Runout caused by improperly made mold, or mold not clamped tight enough. (c) Thin metal. Core setter had gage to locate core, but did not read it. (d) Broken core too weak to stand pressure of iron. A box is provided for employe suggestions. It is claimed that scrap tools and castings have been reduced materially since the campaign was launched

New Jersey

ELECTION of officers of the New Jersey Foundrymen's Association to serve for the coming year was held at a recent meeting of the association. Audrey Winstead, Moore Bros. Co., Elizebeth, N. J., was elected president. He succeeds John C. Phelan, Benjamin Eastwood Co., Paterson, N. J., who has served in that capacity for the past 2 years. Herbert L. Edinger, Barnett Foundry & Machine Co., Irvington N. J., was elected vice president, and J. A. Williamson, Newark, was re-elected treasurer. No action was taken on the post of secretary, a position from which John L. Carter resigned some months ago when he became affiliated with the Office of Price Administrator in Washington.

Principal speakers at the meeting were Mr. Carter, who discussed the new price ceiling order covering iron castings, effective Oct. 26, and John T. McConnell, New York, who discussed the administrative set-up of his regional branch. Approximately 100 attended the meeting.—*John C. Phelan.*

Western Michigan

OPENING the current season of regular meetings, the Western Michigan Chapter of the A.F.A. met at the Ferry Hotel, Grand Haven, Mich., Oct. 5. Eighty-one members and guests attended the dinner. Following the dinner Frank Fisher, led the group in community singing.

Chairman C. J. Lonnee, Muskegon Piston Ring Co., Sparta Division, Sparta, Mich., opened the meeting and asked the treasurer, Charles H. Cousineau, West Michigan Steel Foundry, Muskegon, Mich., for a report of the picnic which indicated it was decidedly a financial success.

Mr. Lonnee then introduced the program chairman, Don Seyferth, who in turn introduced Harry W. Dietert, Harry W. Dietert Co., Detroit. Mr. Dietert presented three reels of films with comments on the value of high temperature sand control. One reel covered high temperature control of molding and core sands; another showed the breaking down tests on cores; and the third showed the control and measurements of the hot strength of molding sands. Following each reel a brief discussion was held and at the conclusion of the three reels a general discussion was enjoyed. The subject was pronounced very interesting especially in the way it was presented.

Fifty-nine members and guests of the Western Michigan Chapter of the A.F.A. were present at the Nov. 2 meeting of the chapter. C. J. Lonnee, Muskegon Piston Ring Co., Sparta Division, Sparta, Mich., chairman of the chapter, presided.

Program Chairman, D. F. Seyferth, West Michigan Steel Foundry Co., Muskegon, Mich., announced the program committees for the year. He also stated that the next meeting would be a Christmas party to be held Dec. 14. Mr. Seyferth then introduced Stanley Davis, manager of x-ray at Campbell, Wyant & Cannon Foundry Co., Muskegon, who spoke on the subject: "Radiography with a Million-Volt X-Ray Machine". Covering the early field of x-ray, Mr. Davis explained its development, methods achievements, bringing up to its present day development, and giving his listeners a clearer understanding of the subject. He then gave in detail the construction and working operation of the million-volt machine which he illustrated with pictures. Mr. Davis showed a number of x-ray films covering gears, shells, crankshafts, blocks, and tank treads, and explained each film as to type of defect found, plane of field necessary to expose type of defect, etc. He also presented technical data as to filter used, time of exposure, and development of film. A general discussion followed the talk.—*K. C. McCready, secretary.*

Equipment Makers Aid Production

Foundry equipment manufacturers have done an excellent job in furthering the American war effort. A splendid tribute to the work which has been done was presented in a recent issue of *Daily Metal Trade* in the column "To the Point" by Earl L. Shaner. His comments are as follows:

Now that the first stage of the great job of tooling up American industry for war production is well along toward completion, it is appropriate to call attention to the contribution of a comparatively small group of equipment manufacturers who are meeting the challenge magnificently.

We refer to the manufacturers of foundry equipment, most of whom are members of the Foundry Equipment Manufacturers' Association which is holding its twenty-fourth annual meeting in Cleveland Friday and Saturday Oct. 30 and 31.

To appreciate how sharply this industry had to increase its operations to meet the unprecedented requirements of war, one should remember that foundry equipment was not in active demand throughout most of the decade of the thirties. In fact, in certain months in 1932 and 1933 the index of foundry equipment orders, based upon the assumption that shipments in 1922, 1923 and 1934 averaged 100, dropped to as low as 9, 10 and 11 per cent of this base.

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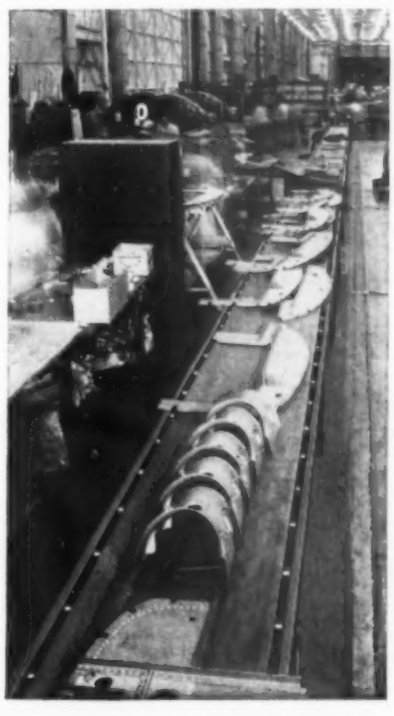

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From this abnormally low point the business of the industry recovered through the late thirties and, under the impact of war, rose to an unbelievable peak of an index number of 1490, based upon the 1922, 1923 and 1924 average equals 100.

For any industry to go from a low of 9 to a high of 1490 in a 10-year period is remarkable. For the foundry equipment industry to take these extremes in stride is phenomenal because the industry is relatively small, is compact and caters to a definite, limited field.

Nevertheless, foundry equipment manufacturers have been successful in meeting every challenge of the rapidly expanding war production effort. To illustrate how it has met unexpected assignments effectively, we can cite two typical instances.

Last March ground was broken for a new steel foundry in the Chicago area. It was to be one of the largest steel casting establishments in the country. Orders for foundry equipment were placed when the original plans were drawn. However, the capacity of the plant was revised several times and the orders for equipment were increased accordingly.

In spite of the fact the equipment industry was confronted by "must" orders from expanding foundry capacity throughout the casting industry, it managed to get out the equipment for this steel foundry so expeditiously that this great steel casting plant—started in March—already is in operation. It was dedicated Thursday Oct. 29, with appropriate ceremonies.

A second illustration has to do with unexpected emergencies. Several times during the past year disastrous fires have swept through foundries engaged in war work. Each time government and industry representatives went to the foundry equipment people with pleas for quick action to provide equipment to get the fireswept plants back into production at the earliest possible moment.

In each instance the foundry equipment manufacturers managed somehow to perform miracles in re-equipping the ravaged casting shops, at the same time continuing their task of equipping the expanding foundry industry.

Since last April the volume of orders for foundry equipment has been receding moderately. This would indicate that the big job of tooling up the foundry industry is tapering off and that the era of big scale casting production is beginning.

Regardless of what the future may hold in store, the foundry equipment manufacturers are entitled to congratulations for the job they are doing in meeting a difficult, unprecedented challenge.

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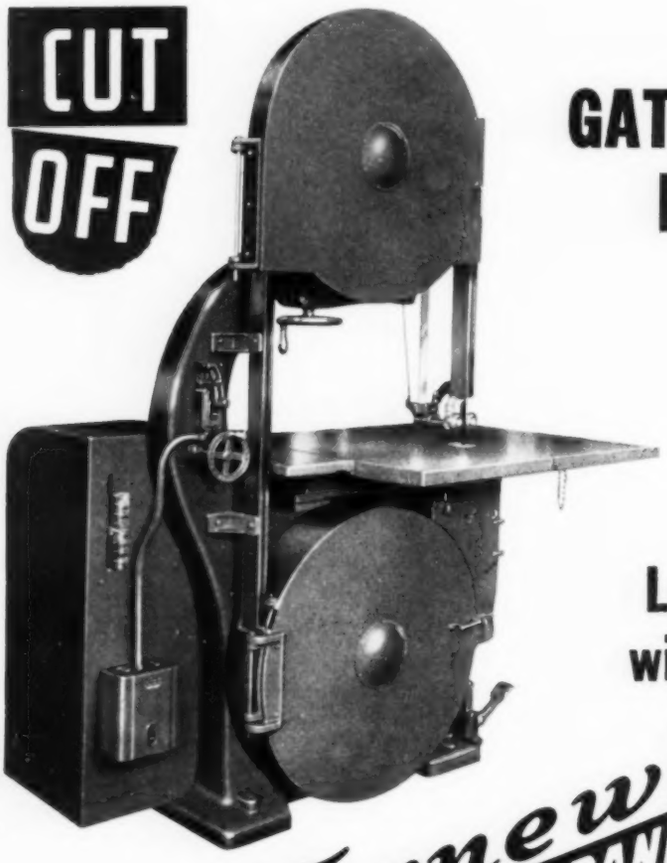

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Furnace Firm Moves To New Plant

Hydro-Arc Furnace Corp., builder of hydraulically controlled electric arc melting furnaces, has opened a new manufacturing plant at 561 Hillgrove avenue, LaGrange, Ill. The new plant will house the general office, engineering department, and shop. These furnaces are used for cold-melting steel and iron or for triplexing steel in the new converter process of the Whiting Corp.

Particular emphasis is placed on the hydraulic positioning of the electrodes in this line of electric melting furnaces. It is claimed that this system gives accurate electrode response and low carbon pick up, low power line surging, and attendant savings in operating cost. The furnaces also have power-operated electrode clamps which permit a system of electrode joint making in a floor level preparation pit. A "short" electrode on a furnace is thus replaced by a floor assembled "long" electrode without the necessity for a man getting up on top the furnace.

W. Harvey Payne is president, and John McBroom, vice president and general manager of the Hydro-Arc Furnace Corp.

Kindt-Collins Co., 12651 Elmwood street, Cleveland, is planning a one-story factory to cost approximately $40,000.

Designs Cabinet

(*Concluded from page* 114)

bars. To facilitate the removal of the cross bars from the trough for the tempering of the sand, saddles, as shown in Fig. 2 are attached to its walls.

For the making of cores, a copper lined drawer or tray 2 x 20 x 30 inches was used and may be seen protruding from beneath the cabinet. A small gas plate and oven served for instructive purposes and gave satisfactory results.

The closed cabinet which contains all the equipment is shown in Fig. 6. For illustrative purposes the lid drops *D* are shown in place. They are attached to the cabinet as shown in Fig. 1. A clear idea of the general construction features of the cabinet, also the principal dimensions may be obtained from Fig. 3. Framing arrangement is shown in clearer detail by omitting from the drawing the ¾-inch matched sheathing with which the cabinet is sealed.

The rails which form the 1⅛ x 3-inch frames for the lids are mortised together and made to enclose the loose strip paneling. The 1⅛ x 3¼-inch material used in making the frames is secured together by the conventional checked joint arrangement. The walls and bottom of the trough are ⅞ x 3-inch open joint lags.

Book Review

Machine Speeds and Feeds, compiled by Hayward-Tyler & Co., Ltd.; fabricoid; 131 pages 4½ x 6½ inches, published by Chemical Publishing Co., Brooklyn, N. Y.; price $2.25.

This collection of tables and data relating to machining operations on cast iron, steels and alloy steels, aluminum and aluminum alloys and other nonferrous metals, has been compiled for the guidance of machine operators on new jobs or new materials. The book does not profess to give the highest possible figures. No attempt has been made to give information on speeds and feeds for treated tools. So far as possible the information for each type of tool is grouped for ready reference. The book reflects British practice and the information is presented under the following heads: Drilling and tapping, core diameters, pipe details, drilling, drill sizes, reaming, turning, calculating speed for milling cutter, milling, straddle milling, tools, speed and feed analysis, standard limits and fits, description of fits, recommended use of fits. The section on tools is illustrated, with shapes and dimensions.

Plant of the International Nickel Co. at Huntington, W. Va., has been honored with its third war production award. This gives the plant the right to fly the Army-Navy "E" with two stars.

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• Guards in industrial plants are trained to protect against sabotage and other subversive activities *they can see*. These guardians of your gates are doing a splendid job—but in spite of their alertness there is one saboteur at large today in many plants—big and small—that is doing more harm than could any two-legged intruder.

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Obituary

MICHAEL W. MERRIMAN, president, Madison Foundry Co., Cleveland, died Oct. 20, in that city. Mr. Merriman organized the firm 45 years ago.

° ° °

Nelson J. Darling, 58, manager of General Electric's West Lynn and River Works, died Oct. 26, at his home in Beach Bluffs, Mass., after an illness of a few months. Mr. Darling joined the General Electric test course as a student engineer after graduation from Cornell University in 1907. In November, 1918, he became plant manager of the Erie, Pa., plant and in 1922, manager of the River Works at Lynn, Mass. Later he was named manager of the West Lynn Works in addition to his duties at the River Works.

° ° °

William K. Bradley, 54, Chicago manager, Detroit Brass & Malleable Works, Detroit, died at his home in Chicago, Nov. 8.

° ° °

Arthur L. Wheeler, former executive, Eberhard Mfg. Co., Cleveland, and manager of that organization after it became the Eberhard Mfg. Co. Division of the Eastern Malleable Iron Co., died Oct. 25 in Minneapolis. Recently Mr. Wheeler was connected with Cargil Inc., Minneapolis.

° ° °

Arthur P. Taylor, 68, president, Charles Taylor Sons Co., Cincinnati, died Oct. 15. Mr. Taylor formerly headed the American Refractories Institute.

° ° °

William L. Evans, 54, general foundry foreman, George King Co. Inc., Sheffield, Ala., died recently. Mr. Evans was a native of Blue Springs, Neb., and had been connected with the King company since going to Alabama in 1926.

° ° °

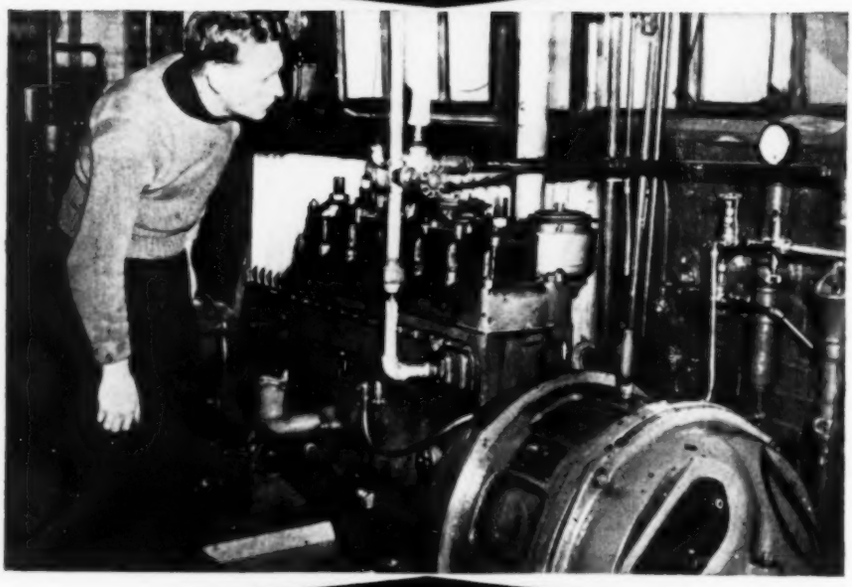
John Gaffney, for several years connected with the pig iron sales department, Bethlehem Steel Co., died recently at his home in Buffalo. At different periods in his career he served as foundry superintendent at the Robb Engineering Works, Amherst, N. S.; the Allis-Chalmers Mfg. Co. (Bullock Works), Montreal; Bethlehem Steel Co., Sparrows Point, Md.; and the Toledo Machine & Tool Co., Toledo, O.

° ° °

Charles H. Norton, 91, chief engineer, Norton Co., Worcester, Mass., died recently at his home in Plainville, Conn. Mr. Norton, a native of Plainville, was educated in the public schools of that city and Thomaston, Conn. At the age of 13 he began work at the old Hame factory where he gained his first experience in polishing metal work with emery wheels. Three years later he became connected with the Seth Thomas Clock Co., Thomaston, and was with that company 20 years. In the late 80's he turned his attention to grinding machines and in 1886 joined the Brown & Sharpe Mfg. Co., Providence, R. I. Shortly after he became a partner in the firm of Leland, Faulconer & Norton Co., Detroit, which now is the Cadillac Automobile Co. Mr. Norton first became associated with Norton Co. in 1900 when the then Norton Emery Wheel Co. founded the Norton Grinding Co. with Mr. Norton as designer and chief engineer, to introduce his methods of cylindrical grinding and to manufacture machinery of his invention and design. When Norton Grinding Co. was merged with Norton Co. in 1919, Mr. Norton became chief engineer for the machine division. He has not been actively associated with the company for a number of years because of his advanced age.

Allis-Chalmers Mfg. Co., Milwaukee, has issued a 16-page bulletin on the care of rubber v-belts. It describes how a belt operates, and the causes and remedies of belt injuries.

420 cu. ft. of air from 23.4 sq. ft. floor area .... with integral cooling



...offered by Schramm in a complete "BUILT-IN" MOTOR DRIVE COMPRESSOR UNIT

More air in a hurry—that's what Schramm Compressors supply in small space, when and where needed and without special time-consuming foundations, assembly or piping.

Note the compactness of the Schramm unit shown here in comparison with a man of average size. Both motor and compressor are mounted as a single unit on a sub-base that serves as a foundation. Such a unit can be installed wherever current is available. Floor space for the 420 cu. ft. model shown is only 90" x 37½".

Integral water-cooling is another feature. If you were to "Watch the Thermometer" on any Schramm water-cooled compressor you would find no wide variation between the temperatures on the different sides of the cylinder heads, an advantage that eliminates unequal expansion and contraction.

SEND FOR CATALOG 42-S

SCHRAMM, INC. *The Compressor People* **WEST CHESTER, PA.**

SCHRAMM *Air Compressors*

foundry activities

EMPLOYES of Bullard Co., Bridgeport, Conn., recently purchased and presented a Republic P-47 fighting plane to U. S. Army Air Forces. The presentation was made at the Army Air Base, Stratford, Conn., on Oct. 18, and later 5000 Bullard employes and members of their families attended a celebration of the presentation at the machine tool plant.

° ° °

Wells Motors Ltd., 1245 York street, London, Ont., is building a plant addition and will install additional equipment.

° ° °

Oil City Brass Works Inc., Beaumont, Tex., is taking bids for remodeling of its present plant and constructing new buildings.

° ° °

Cooper-Bessemer Corp., Mount Vernon, O., in September surpassed its monthly production goal for the fourth consecutive month.

° ° °

National Youth Administration foundry on Stewart avenue, Flint, Mich., is training 80 girls between the ages of 17 and 25 as coremakers.

° ° °

Flour City Ornamental Iron Co., Minneapolis, W. B. Tetzlaff, president, has awarded contract for a four-story factory addition.

° ° °

Utica Radiator Corp., 2201 Dwyer avenue, Utica, N. Y., plans a factory addition. Giffels & Vallet, Marquette building, Detroit, are engineers.

° ° °

J. I. Case Co., Racine, Wis., has let contract to Austin Co., Chicago, for one-story factory building adjoining the South works.

° ° °

Commerce Pattern, Foundry & Machine Co., Detroit, has been awarded the Treasury Department's bull's-eye flag. All of the company's more than 700 employes are participating in the payroll deduction plan for the purchase of war bonds.

° ° °

Ohio Pattern Works & Foundry Co., Cincinnati, is celebrating its fiftieth anniversary. Joseph E. Hausfeld, a cofounder of the company, is chairman of the board. Other officers include: E. B. Hausfeld, president; H. A. Nash, vice president; E. L. Fehring, treasurer, and Edward Huseman, secretary.

° ° °

Laconia Malleable Iron Co. Inc., Laconia, N. H., has adopted a group insurance program which provides life in-

THE USE OF AJAX *Phosphor-Copper*

Send for booklet
"INGOT METALS OF TODAY"

●

15 STANDARD ALLOYS BY AJAX

Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax Nickel-Copper 50-50%
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

NOTE

*"Proper Melting Decreases Foundry Losses," contains interesting data. Also, the booklet, "Nonferrous Ingot Metals of Today." Write for both of these. They are free.

Successful foundrymen deoxidize or "clean up" molten metal by a scientific method worth using *as indicated:*

They use phosphorus . . expertly . . in the form of "Ajax Phosphor-Copper" . . added as the crucible is removed from the furnace . . for virtually all brass and bronze alloys.

In notched waffle sections, or in shot form, Ajax 15% P-Cu does its work at .01% (1 oz. per 100 lbs.). Introduced, and having time to react when stirred with a whirling motion of the skimmer, it causes oxides to rise for effective removal by skimming from the surface. It is best to avoid phosphorus build-up from back stock.* . . If you use phosphorus these days, use Ajax Phosphor-Copper (useful also in producing your phosphor bronze).

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ESTABLISHED 1880 PHILADELPHIA

ASSOCIATE COMPANIES: AJAX ELECTRIC FURNACE CORPORATION, *Ajax-Wyatt Induction Furnaces for Melting*
AJAX ELECTROTHERMIC CORPORATION, *Ajax-Northrup Induction Furnaces for Melting, Heating*
AJAX ELECTRIC COMPANY, INC., *Electric Salt Bath Furnaces*
AJAX ENGINEERING CORP., *Aluminum Melting Induction Furnaces*

surance, sickness and accident benefits, and payments in case of hospitalization or surgical operations. The plan is underwritten by the Metropolitan Life Insurance Co., and is on a co-operative basis.

* * *

James Morrison Brass Mfg. Co. Ltd., 276 King street West, Toronto, Ont., is taking bids for construction of a plant addition.

° ° °

Pacific Gray Iron Casting Co., 9430 Rayo avenue, Los Angeles, is the firm name under which George Familian and Isadore Familian have obtained a certificate to conduct business.

° ° °

Union Brass & Metal Mfg. Co., 501 West Lawson street, St. Paul, has awarded contract for construction for a one-story plant addition.

° ° °

Waukesha Foundry Co., Waukesha, Wis., has organized its own scrap drive in a spirit of friendly competition between various departments and divisions. According to Emil Howe, sales manager, the drive was so successful the company decided to pass the idea on to its customers. Current advertising, instead of featuring Waukesha metal and 100 per cent sanitary ball bearing pumps, will push a scrap search—pointing out to readers that they are standing in their own shadow unless they throw their scrap into the fight.

° ° °

Wellman Bronze & Aluminum Co., 2525 East Ninety-third street, Cleveland, is planning another addition to its plant. Fred S. Wellman is president.

° ° °

Fritzell Foundry & Casting Co., 573 Dixwell avenue, New Haven, Conn., has let contracts for altering foundry and storage buildings.

° ° °

Pacific Car & Foundry Co., Renton, Wash., is building a foundry at an estimated cost of $3,000,000. O. D. Conover, Cleveland, is engineer.

° ° °

National Aluminum Cylinder Head Co., 3420 East Ninety-third street, Cleveland, has been awarded $850,000 for additional plant facilities by the Defense Plant Corp.

° ° °

A new plant for the manufacture of cast steel valves for the Navy and others has been completed for Walworth Co., by the Rust Engineering Co. The plant is located in the Middle West.

° ° °

Ohio Steel Foundry Co., Lima, O., has been authorized an increase in its contract with the Defense Plant Corp. for $1,000,000 to provide additional equipment.

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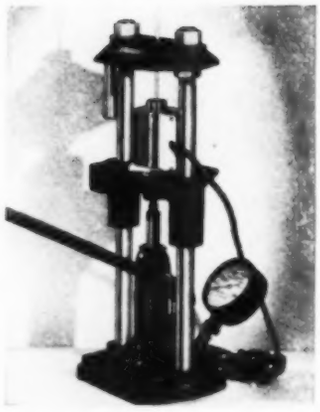

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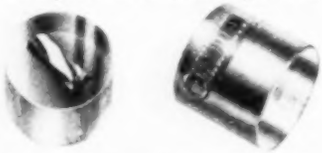

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Book Review

Nickel and Nickel Alloys, fabrikoid, 592 pages, 6½ x 9 inches, published by the International Nickel Co. Inc., 67 Wall street, New York.

This volume in loose-leaf form provides a valuable compendium of information on nickel and its alloys. While the major portion of the book is devoted to wrought materials, one section relates to castings. Various sections cover chemical composition, chemical analyses and tests, corrosion resistance, physical constants, mechanical properties of wrought monel, inconel, nickel and nickel alloys, mechanical properties of wrought special high nickel alloys and clad materials, special mechanical properties, properties of some metals and alloys, mechanical properties at elevated temperatures, mechanical properties at low temperatures, metallographic examination and x-ray diffraction analysis, working instructions, heat transfer through metallic walls, castings, and appendix. The book has a 66-page index which aids considerably in locating references.

Controlling Today's

GRAY IRON PROBLEMS

By FREDERICK G. SEFING
International Nickel Co.
New York

WAR means the foundry industry must do things it previously thought impossible, and to do without things it thought were indispensable. Restrictions, limitations, etc., along with the demand to produce castings rapidly are the order of the day. These difficult times, however, provide a stimulating challenge to the ingenuity and resoursefulness of American foundrymen. Necessity was and still is the mother of invention.

It is necessary to get along with poor scrap, low grades of coke, fewer alloys, and with less time than formerly to do a job for which there has been little or no let up on specifications. The industry formerly had steel rail scrap, now it has forge flashings, steel sheets, punchings and rusted "tin" cans. Scrap used to be separated carefully into machinery scrap, stove plate, etc.; now foundries have only so called No. 1 gray scrap which actually does include the kitchen sink.

Before the war foundrymen had hard dense uniform coke; now they are glad to get any coke at all. They had a variety of alloys; now they have almost none. Back several years there was time to do things; now everything should have been made yesterday. The purpose of this discussion is to indicate what can be done about these restrictions and yet make satisfactory castings.

Watch All Factors

Today it is more difficult than ever to show a profit, due to high taxes, high production costs, price ceilings, etc. Foundrymen must be especially careful, therefore, that scrapped castings are at a minimum. Size of the scrap pile is an inverse measure of success. Some of the points which the foundryman must consider carefully are outlined in the following discussion.

Control of Molding. Control the sand as to moisture and permeability and be sure the sand is recommended for the work being poured. This information is obtained easily and may prevent a lot of trouble. Generally that sand is best which has the highest permeability, lowest clay content and, at the same time, the proper fineness for the desired finish. Do not permit irregularities in the moisture, permeability and grain size of the sand. Adjust the sand conditioning so that at all times the sand shows the same properties.

Standardize gates as to dimensions and as to distance of sprue from mold cavity. Design the gates to get a sufficient quantity of clean metal into the casting. If a strainer core is used, be sure not to throttle the pouring speed too much. More trouble results from too slow pouring than from rapid pouring.

Vent all cavities carefully with small rectangular bleeders, vents or pop-offs which prevent mold gas pressure and promote quieter pouring. The rectangular vents do not collect gas at the casting juncture; round or square vents do.

If feeders are used, attach them to the side, not on top of the casting. Set the feeder close to the casting and make it of adequate size for feeding but have the design so the feeder can be broken off without taking part of the casting with it. The author has had good success using a closely coupled feeder for feeding a 3-inch section which is proportioned about as follows: A feeder of 4 to 5-inch in diameter set about ¾ to 1-inch from the casting and attached with a gate deeply filleted so as to have a connection of about 2 inches square about ½-inch away from the casting has worked well. Similar proportions have worked on smaller and larger sections.

Pour through the riser whenever pos-

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sible but if this is inconvenient, fill up to the riser then top it off with hot metal.

When setting pouring gates and feeders think constantly of "directional solidifications". Indeed, it frequently is desirable to change the design to get sound castings but the simplest approach to the best design at all times is the application of directional solidification.

Control of Analysis of Metal. Time and money must be spent on the selection and sizing of scrap. Since the scrap dealer refuses to do this today, the foundryman must do it. Separate machinery scrap from furnace, agricultural or other scrap; separate the heavy steel or gray iron from the light scrap.

Set up charge mixtures to be as uniform as possible through the heat and from day to day. This is controlled by the operator's judgment on how much can be spent to get uniform metal mixtures to be charged into the furnace.

Regular time tapping intervals with smooth uniform cupola operation promote uniform carbons. A clock should be used to time the cupola charging and tapping but see to it that the cupola tender uses it.

Use a chill test on each ladle or at regular intervals. When the chill is coming too deep for the job, use silicon in the ladle to reduce the chill; when it is not deep enough, use mill scale or chromium to raise it. Learn how many ounces per 1000 pounds of metal are required to raise the chill 1/16-inch or lower it 1/16-inch on the chill test bar. If you cannot get chromium and wish to try mill scale, be sure the metal is very hot, over 2800 degrees Fahr., and give it time to react.

Uniformity can be helped a great deal by using a receiving ladle holding two or more charges. Collecting two or more charges smooths out the variations of analysis of the metal coming over the spout.

Run the analysis of carbon and silicon daily and occasionally the manganese, sulphur and phosphorus. These analyses with the chill test will help in adjusting the charges to meet the properties and machinability of the castings to be made.

Keep in Condition

Control of Melting Practice. All charging, furnace and ladle equipment should be in good working order. Usually only a small amount of repair is necessary to keep elevators and ladles from sticking and motors from burning out. See that air lines to the cupola are tight. This will increase the air to the cupola and give better control of its operation.

Use enough coke but do not waste it. In the author's experience with all sizes of cupolas lined to 30 inches or more, the iron to coke ratio need never be richer than 8 to 1, even with a 50 to 60 per cent steel charge.

Changes that are too large cause irregular cupola practice and often waste coke. Metal charges should weigh from about 50 to 80 times the square of the cupola diameter in feet. Use uniform coke sizes 1/12 the cupola diameter and not too large pieces of scrap.

Adjust the bed height to the blast pressure, using the calculations: bed height in inches = 10.5 times $\sqrt{\text{blast pressure}}$ plus 6". Check bed height every day immediately before charging.

After the full bed has burned through leave tap hole open and blow it in for 4 or 5 minutes just before charging. Turn on the wind after charging to have a good hot stack, for hot iron at the start of the heat and to prevent excessive carbon pickup in the first iron.

Watch for greater settling of the more friable, softer cokes now frequently delivered.

Do not stop the wind on the cupola to wait for molds. This practice causes excessive carbon pickup and the iron runs cold.

Control of Pouring. Have white hot ladles or why bother to get hot iron at the spout. Get rid of the metal as rapidly and efficiently as possible. Plan to pour each transfer ladle with no shuttling back and forth in the shop but pour each ladle at one location. When a ladle contains cold metal, pig it! Do not heat up the leftover cold metal with more hot metal at the spout. All this does is make a full ladle of cold metal.

Know your metal temperatures, particularly when pouring, not by guess and by gosh, but by pyrometer. Pouring

(*Concluded on page* 153)

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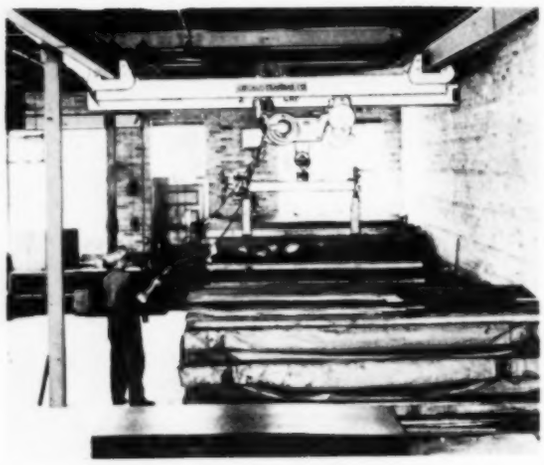

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A self-supporting crane with 220 degree swing. Capacity up to 3000 lbs. with 14' radius. Furnished with hand or electric hoist, as required.

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CORE BINDERS FULFILL

Many Requirements

By HARRY W. DIETERT
Harry W. Dietert Co., Detroit

FEW materials in industry must perform as many exacting functions over a wide range of operation and temperature as a core binder in the foundry. Whether it be in the selection of a core binder or in the use of a core binder, one should know definitely how the core binder performs each duty or function. Desirable attributes and characteristics of a core binder include a total of twenty four distinct items as shown in the accompanying table.

With the wide selection of core binders now on the market, one may control the manner in which the core binder functions at each of the many operations, whether it be concerning the raw material, mixing, making, baking, storing, pouring or shake-out. It encourages a foundryman after he understands each function of a core binder and masters the complete control of a core.

Binder Attributes

1. Core binder to be in concentrated form.
2. No settling out in drums or storage tanks.
3. To be preferable in a single package.
4. To be easy to handle.
5. To lend itself to be worked with dry or damp run of the mine sand.
6. Easy to mix with the sand.
7. Minimum of cleaning of mixing equipment
8. Slow to air dry.
9. Core binder should not drain to bottom of storage pile of the mixed sand.
10. Should not impair the flowability.
11. Freedom from sticking to walls of core box.
12. Lend itself to green strength control.
13. Cleanliness of handling.
14. Ease of booking and patching.
15. Easy to bake.
16. Not sensitive to atmosphere in oven.
17. Baked cores should free themselves easily from dryer or core plate.
18. Possess good warm strength.
19. Low moisture absorption.
20. Possess ample strength, core hardness and permeability.
21. Possess minimum quantity of gas.
22. Possess ample collapsibility.
23. Lend itself to hot strength control
24. Possess minimum retained strength.

A core binder should be in a concentrated form, that is be strong so that only a small volume of core binder is necessary to bond a batch of sand. A core binder that will bond a sand strongly may be considered as being in the concentrated form. For example when an oil to sand ratio 1 to 60 parts by volume or better is obtained.. When an oil to sand ratio of 1 to 40 parts by volume or less is required, then the core binder is not in a concentrated form.

The disadvantage of using an oil that is not in the concentrated form is that freight, receiving and handling charges and also storage facilities are increased as compared to a concentrated core binder. A core binder that settles out in drums or in storage tanks is highly undesirable in that the ingredients of the core binder separate causing a non-uniform oil, resulting in scrap cores.

Core binders that are received in a single package and ready to use as delivered to the core room are desirable in that only one material need to be purchased, received, handled, stored and measured at the time of mixing. Where the core binder consists of two or more separate ingredients, supervision and labor is increased. It is also necessary to increase the storage and handling facilities. The operator at

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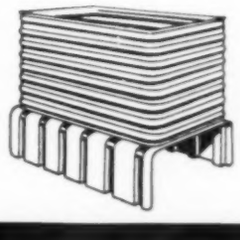

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TRUSCON FOUNDRY FLASKS

the sand mixer with a single package has only one ingredient to measure as compared with two or more ingredients which increase chance for error when the core binder is not in a single package. It is acknowledged that in many foundries more than one type of binder is required to secure a core mixture that possesses all of the required properties. In this case the addition of two or more binders is required, and is the correct procedure. However the number of binders should be kept to a minimum.

The ease of handling of a core binder is an item to be considered in weighing the merits of a core binder. A core binder should lend itself to easy handling, storing and measuring.

Dried core sands have certain advantages such as ease of moisture control in the mixed sand and ease of measuring a definite quantity of sand per batch as compared to the lower price run of the mine sand which is moist. Most plants use run of the mine sand which requires that the core binder in itself contains no water, or at most a very small quantity, to avoid wetting a moist core sand to the heavy or wet side. Amount of water used in emulsified core binders should be low. Where the core binder works with any type of sand the supervision is reduced materially and it provides much more flexible operation.

A core binder should be mixed easily with the core sand to save time in mixing and to insure that a uniform distribution of core binder is obtained in the minimum of time and with the minimum of mechanized effort and power. Sticky and gummy core binders and those that air dry rapidly create additional labor in keeping the mixing and measuring equipment clean which increases the cost of operation.

A core binder that air dries slowly allows greater freedom of operation in the core room. The mixed sand may be stored a longer time permitting the mixing of sand in greater volume at one time requiring less time for cleaning, mixing, measuring and core making equipment. Those core binders that air dry rapidly require cleaning of equipment when operations are halted for a short space of time to avoid having the sand dried hard and fast to the equipment. Precautions such as placing damp sacks over mixed sand need not be exercised when the core binder air dries slowly.

Drainage May Occur

Those core binders that drain or settle to the bottom of the stored sand in the hoppers, boxes or in the piles of stored sand on the floor are undesirable. The amount of drainage is increased as moisture content increases.

Impairment of the flowability of the core sand by the core binder is an item to be considered. Flowability or the ease with which a sand rams in the restricted portion of a core box is reduced frequently by the core binder. The reduction of the flowability of the sand may cause porous surfaces on the baked core resulting in either scrap cores or in metal penetration should the core be used.

Sticking of core sand to the interior surfaces of a core box causes considerable delay in core making. Frequently the sticking is caused by the core binder. Other factors affecting sticking are green strength, temperature of the core box surface, finish of the core box and moisture content of the sand. Increasing the green strength of the mixed core sand is a remedy for excessive sticking of the sand to the walls of a core box.

The core binder should impart to the mixed core sand a green strength of a constant value. The green strength of the core binder should not be too sensitive to the temper of the mixed sand. When the green strength of a binder

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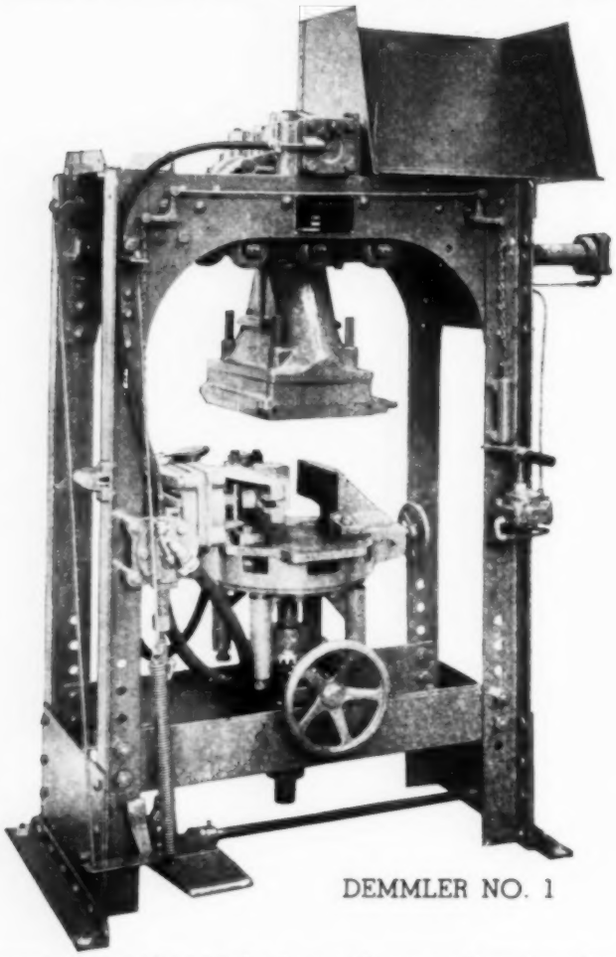
DEPENDABLE **CORE BLOWING** EQUIPMENT



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CORE BLOWERS *Exclusively*

is consistent under operating conditions then it is possible to add a definite quantity of green strength imparting material.

Good housekeeping is being practiced more each day in the foundry. It requires that the core binder be as clean as possible and pleasant to the hands of the core maker. In fact, core makers themselves seriously object to any core binder that is exceedingly dirty and sticky.

Many cores are booked where two halves of a core are folded together to form a single core. The binder should knit or bind the halves together tightly. Any flash air drying of a core binder will seriously handicap booking. A core also should lend itself to patching by hand tools.

Binder Not Too Sensitive

A core binder should be easy to bake. In other words the core binder should not be too sensitive to time or temperature of the baking operation. Neither should it be sensitive to degree of baking with reference to size of the core. Light sections of a core should not over bake by the time that the heavy sections of a core are baked thoroughly. The less sensitive a core binder is to degree of baking with reference to size, the greater freedom is given the core room in baking small and large cores in the same oven.

A few core binders are sensitive to atmosphere within the core oven. A core binder should not be affected adversely by acid fumes from the combustion of the fuel used for heating the core ovens.

Freedom from sticking of the baked cores in dryers or on core plates is also an attribute desired of a core binder. Those core binders that cause additional effort in rapping cores from dryers or from plates are not desired. In many foundries the cores are removed from dryer or plate while still quite warm. A core binder should possess a satisfactory warm strength for example at a temperature of 150 degrees Fahr. so that the cores may be rapped out while still warm. The warm strength of a core may be determined by testing the transverse strength of the core at 150 degrees Fahr. A satisfactory hot strength may be set at 75 per cent of the room temperature transverse strength. The tensile strength test also may be used to determine the warm strength.

Tensile or transverse strength loss due to moisture absorption of the core during storage in the foundry or while set in a mold for a period of 24 hours should not exceed 60 per cent. Excessive strength loss due to moisture absorption requires that the additional amounts of core binder be used so that stored cores still will be strong enough to avoid high breakage and metal penetration. High strength loss or surface softening due to moisture absorption often erases all other advantages of a core binder.

A core binder should impart ample strength and core hardness when used in oil to sand ratios by volume in the range of 1 to 40 or 1 to 120. When oil to sand ratio lower than 1 to 40 is necessary, then an excessive bulk of core binder is required resulting in disadvantages as mentioned previously in this discussion. The permeability of a core usually is desired to be more than ample so as to insure free venting of the gases. Thus any serious reduction in permeability by a core binder is generally undesirable.

Core binders that generate a considerable amount of gas on pouring of the mold are looked upon with disfavor in that additional mechanical venting must be provided to take care of the additional gases. The gas generated by a core binder should not be too offensive nor should it condense on cooling there-

(*Concluded on page* 149)

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Electro-Chemical Pattern & Mfg. Co.
Detroit

FIRST mention of producing patterns by electro depositions was made in 1841 by Thomas Spencer, British Patent No. 8865. The first work on record in this country on deposited patterns was done by Keep of the old Michigan Stove Co. in 1890. In Vol. 15, 1906 A.F.A. *Transactions*, F. L. Antisell described a method of producing patterns and copper matches by electro deposition. Nothing much was done to further the production of patterns by this method until 1923. No doubt, work had been done but no published records seem to be available.

Certain molding materials have to be used in the process including wax, bismuth, lead alloys and plaster of paris. Briefly, a mold is made and then a thickness of copper is deposited electrically on the inside. The copper shell is removed from the mold and filled with white metal. Brass strips are attached for the dowel pins.

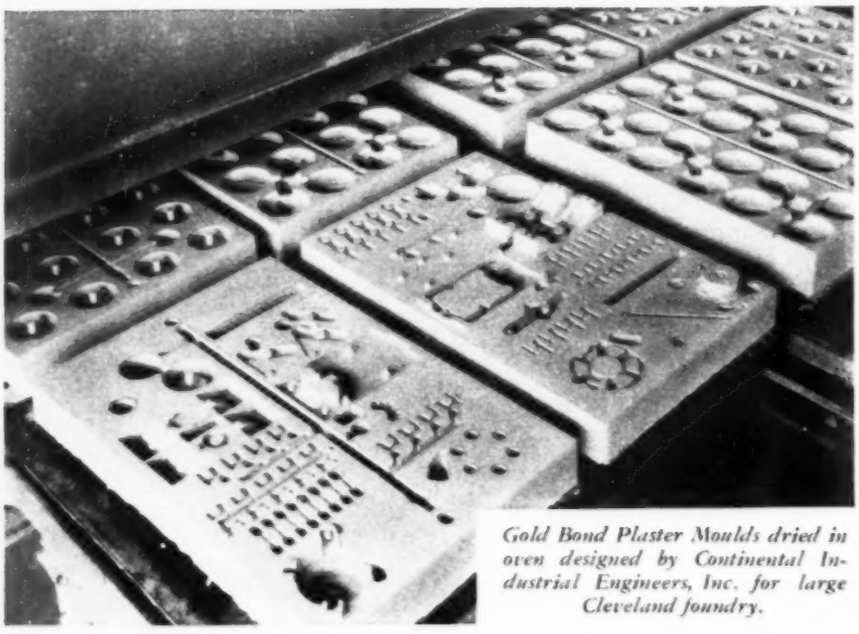
Ninety-nine per cent of the copper shell patterns are made by using plaster as a molding material. Wax and soft alloys can be used only for special cases. When wax is used the object to be reproduced is pressed into the molding material. In general pattern making, a good grade of dental plaster should be used. The accepted practice in pattern making is to sift the plaster into water until no more is taken up. The resulting set plaster varies in hardness, strength and expansion. Most consistent results are obtained by measuring the water and weighing the plaster. Three pounds of the average plaster is used to 1 quart of water. After standing for a few minutes, it is stirred until the original consistency thickens and then poured. For thinner consistency, less plaster can be used, as low as 2½ pounds to 1 quart of water. Plaster never should be poured until the original consistency thickens, otherwise, the time of setting is increased, softer plaster is produced and a tendency to stick results. Plaster mixed with 3 pounds to 1 quart, setting time about 20 minutes, expands 0.0022 inch per foot when still hot, then drops down to 0.0019 inch per foot when cool, and does not change after standing for months. This expansion can be cut to some extent by adding inert materials, increasing the water content and by the use of accelerating the retarding mixtures. There are plaster mixtures on the market that set to a very hard dense mass which are used a great deal for master patterns on duplicating machines.

Measure the Shrinkage

Using 1 quart of water to 6 pounds of plaster in one of the mixes specified, an expansion of 0.0015 inch per foot was obtained when hot. Two days later when dried, 0.0012 inch per foot was registered, 10 days later 0.002 inch per foot, and one month later a shrinkage of 0.003 inch per foot was shown. It is even possible to get shrinkage after drying a day or two by increasing the water content. Although these materials may serve their purpose they are unstable in the set form.

A convenient way of measuring expansion is to take a standard steel foot scale, grease and lay it on a flat plate, then put a small piece of brass on each end of scale, using grease on bottom to hold in position. Pour plaster 1-inch or more on top of scale and brass. Whe-

No surface machining of castings made in GOLD BOND plaster moulds



Gold Bond Plaster Moulds dried in oven designed by Continental Industrial Engineers, Inc. for large Cleveland foundry.

SMOOTHER, more intricate, non-ferrous castings without surface machining—that, in a nutshell, is the story of Gold Bond Metal Casting Plaster.

This plaster has remarkable water-carrying capacity and strength. The water, driven off in the drying oven, leaves moulds and cores more permeable to gases.

Gold Bond Metal Casting Plaster has a finer grain, too. With its greater strength, this makes Gold Bond Plaster particularly suited to core making. You can design to closer tolerances and thinner cross sections without the necessity of finish machining.

Non-ferrous foundries who are interested in better castings at lower cost can get full details from their Gold Bond Industrial Technician or by writing to the Industrial Sales Division, National Gypsum Company, Buffalo, New York.

Gold Bond
FOUNDRY PRODUCTS

ROCK WOOL INSULATION . . . RAW DOLOMITE . . . CASTING PLASTER . . . NON-SILICA PARTING BASE

NATIONAL GYPSUM COMPANY, BUFFALO, NEW YORK

set remove scale and let scale cool down to room temperature. Then, with the aid of feelers and scale, the exact expansion can be determined. There are other methods that can be used, but this is the most convenient.

Expansion causes the difficulties that sometimes occur in removing patterns from plaster and plaster cores from coreboxes. Expansion does not reach its maximum until the plaster temperature is at its greatest. Any tendency to stop expansion will cause warping.

Many separators or materials are advocated to aid drawing plaster from patterns or coreboxes. The best is ordinary thin grease or dope, that contains soap materials and oil. The soap in the grease not only acts as a separator, but allows the plaster to wet the surface of the pattern to some extent, thereby getting more accurate detail and less bubbles. Only a skin coating is necessary to facilitate removal and to prevent sticking.

Patterns Are Split

Most of the plaster expansion dissipates by the time the pattern is finished. The single shrink patterns are either wood or metal. Patterns should be split, but if necessary a split duplicate copper pattern can be made from a solid pattern. This is the only process by which the working pattern can be made first. Trial castings taken and any changes necessary can be made before production patterns are started. There is absolutely no shrinkage between the copper pattern and the pattern to be duplicated.

The required number of molds to fill a plate are taken from the pattern submitted, and are dried in an oven at temperatures below the decomposition point of plaster, which is around 140 degrees Fahr. Dryness of the plaster can be determined by loss of weight, usually 35 per cent, or by noting when the conductivity reaches zero. An instrument developed for this purpose is known as a moisture detector. The molds are then waxed, allowed to cool and made conductive by suitable means, such as graphite or metal powders. Wires are attached to connect conductive surfaces and cathode rod in plating tank.

Plating is done in still tanks for 3 to 6 days or until the desired thickness is obtained. Temperature of tanks is around 80 degrees Fahr. Minimum thickness of 1/32-inch usually is obtained, but to obtain this minimum, other parts of the deposit might be ⅛-inch or more in thickness. When deposits are finished they are removed from molds, hot tinned, and backed with white metal. Brass strips are added in pattern as a good medium for screws and dowels and also for a strengthening agent.

These patterns are machined to their parting surfaces on a lathe by placing them in plaster of paris or white metal jigs. Jigs are made from the original patterns or copper duplicates. The machined halves are matched cope against drag in a plaster jig made from the matched original pattern. Halves are tacked together with solder. Fins set up by machining are removed by filing. The patterns from this point are complete ready for mounting.

One proof that these patterns are accurate is that all copper patterns are machined and matched from the same plaster or white metal jigs. Accuracies are held to a few thousandths of an inch in machining. The copper surface contours made by the original pattern impression are perfect. With patterns as alike as it is humanly possible to make them, castings are bound to be more regular and a good deal of machining difficulties will be eliminated. Castings will have a more uniform weight.

Frequently patterns with an odd design are required. These designs are not always machinable, and must be hand worked. With a number of patterns on a plate, this means either considerable working to templates, or slipshod guesswork as to shape, perhaps resulting in no two being alike. Quite often this odd design is the only means of holding

"BRANFORD"

The VIBRATOR with the kick

PLATE VIBRATORS . . . *All steel hardened and ground.* The Regular type is a spring type for horizontal operation. Another, the Angle Springless, operates at 45°. It is excellent for use in close molding. A third type is the Double Attaching Head, for use on plates with specially designed lug.

DOUBLE ATTACHING HEAD VIBRATORS . . . Used in special mountings for adaptation to Molding Machines. Also for any place where bridging over or hanging up of materials occurs, as in hoppers, bins, chutes. We carry a line of adaptor plates or brackets for applying these Vibrators.

FLASK RAPPERS . . . Made in sizes 2″ to 8″ piston diameter. Capable of handling a range of flasks from smallpressed steel flasks up to heavy cast steel flasks 20′ square to 4′ in depth. Cuts down labor expense in cleaning flasks, also maintenance costs in upkeep of them. Send for questionnaire.

ANNEALING POT RAPPERS . . . The New Bolted Type, with jaw opening 3¼″, saves pots and reduces the packing time. It cuts costs in the annealing department; fragile castings can be shovelled in, not "packed by hand", and improves sand packing. In ordering, give thickness of pot wall; if flanged, give width across top flange.

This is but a part of our large line of Air Operated, Labor saving Foundry Equipment. Write Dept. 5 for complete catalogue.

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NEW HAVEN VIBRATOR CO.

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Branford Plate Vibrators
Air Tool Fittings
Sprayers, All Kinds
Shake-Out Vibrators

1918 BRANFORD VIBRATORS U.S.A.

Hopper Vibrators
Container Loading Vibrators
Annealing Pot Vibrators
Vibrator Tables

castings in chucks or jigs for machining. If the patterns are alike, all castings fit the fixtures properly. If patterns are dissimilar, castings often are machined off center.

Engineering changes readily can be made on copper patterns. They are easily altered or patched with brass, copper or steel, and a soldering iron, without excess electrolytic corrosion between patch and pattern. Copper patterns are not as light as aluminum, and the size is limited to about 20 inches. The wearing qualities compare favorably with cast iron and, in some cases are better.

The white metal backing alloy is one of the hardest that can be made and still serve the purpose. It is composed of copper, lead, tin and about 20 per cent antimony. Shrinkage has been cut down to around 0.005 inch per foot. The average white metal, such as tin and zinc, shrinks to a considerable extent. The only two common metals that will eliminate or reduce shrinkage are antimony and bismuth. These control shrinkage when alloyed with tin, cadmium or lead. Antimony produces harder alloys and is cheaper.

Principles of electroforming present many advantages in the art of pattern-making. Many aluminum or magnesium coreboxes used on core blowing machines are brass faced. These facings become worn or uneven and must be replaced or spotted. Depositing copper on worn faces and re-machining eliminates replacement and spotting. Many rapidly wearing sections of boxes can be replaced, by electroformed reproductions.

Where a pattern or corebox is made from brass or copper, worn spots can be rebuilt by deposition. Solder fillets can be replaced by copper, by patching an old metal or wood pattern with wood, plaster, paper, etc., the desired changes can be made. The patched pattern can be used to produce the required number of copper patterns.

By the electro-copper process irregular parting jobs can be converted to cope and drag plates, especially where pattern and partings have complicated shapes, entailing an enormous amount of time of machining and the registering of cope and drag sections. For example, hand wheels, and ball and socket disks for valves, etc.

In nearly all castings the vertical shrinkage as a rule is greater than the horizontal or parting shrinkage. This can be taken care of by making the pattern proper larger through the vertical dimension and keeping the parting dimension to size.

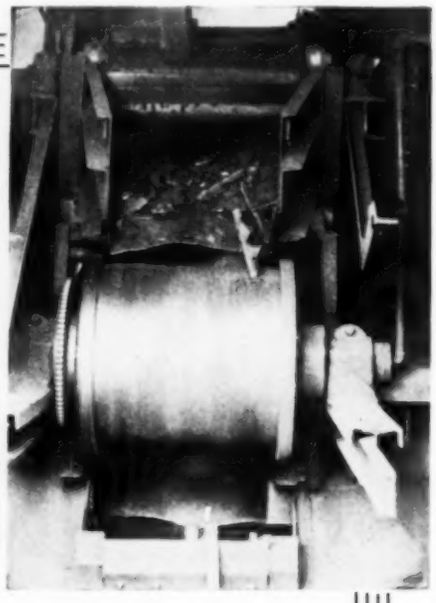
Separator Placed in Center

Where patterns are mounted on two sides of a plate, the working pattern is machined to size on body as well as core prints. A separator is placed between pattern halves. This separator must have thickness equivalent to the added rise wanted on cope. The prints are re-machined, making sure that only the cope side of prints are touched. The separator can be left on cope side of pattern or removed. In either case, knowing the additional thickness, patterns can be produced. Where patterns are mounted on one side of the plate, the right thickness of separator will be used, but half will be on the cope side and half on the drag side of pattern.

Many times, in setting cores that have round prints, several difficulties can be eliminated if the core prints are oval; that is, to size on the vertical dimensions and a few thousandths of an inch over size on the parting dimension. This procedure tends to eliminate core crushes due to rapid setting of cores, misalignment of patterns and loose flasks. Coreboxes can be used longer before crushes occur on parting of mold due to wear on corebox prints.

The pattern proper is brought to size, then a separator is placed between the halves and prints machined. The vertical dimension is machined over-size, equivalent to the thickness of the separator. When the separator is removed, the

A Difficult SAND RECLAIMING Job Licked by Stearns MAGNETIC



HOW to eliminate the scrap metal from hot sand coming off of a steel conveyor was a problem in the foundry division of a prominent automobile maker. And this sand was hot! Conveyor belts were out of the question.

STEARNS Magnetic engineers were consulted and made a study of this problem. Out of their many years of experience in solving foundry problems they installed this specially designed and constructed magnetic drum. It's doing a swell job!

Avail yourself of STEARNS Magnetic advice on sand reconditioning problems or other jobs involving the removal of iron. We can give you a positive, automatic, time and labor saving method with STEARNS Magnetic equipment.

We will be glad to mail this folder or other Bulletins on Magnetic Separators. Write for them.

STEARNS MAGNETIC MANUFACTURING CO.
662 S. 28th St., Milwaukee, Wis.

vertical dimension corresponds to that of corebox. Naturally, pattern costs will run considerably higher if one wishes to apply this system in machining the required number to fill a plate. In making copper patterns only one split, wood or metal, working pattern with this added feature is necessary to gain the effect. Deposited patterns are not a cure for all pattern and casting ills, but they are one step in that direction.

From a paper presented at the Cleveland convention of the American Foundrymen's Association April 20-24, 1942.

THE EDITORS

Core Binders Fill Many Requirements

(*Concluded from page* 145)

by depositing a gum on baking or flask equipment.

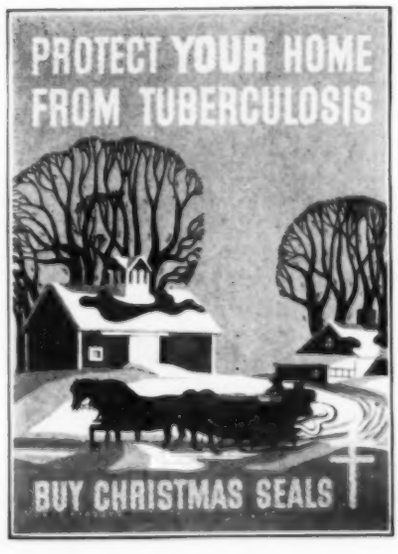
The core binder should collapse, that is disintegrate or burn up, at a sufficient rate to allow the casting to contract while the metal is solidifying and cooling. Rate at which a core binder collapses may be measured exactly with a dilatometer. Rate of core collapsibility is measured in minutes for fast, medium and slow collapsing cores. A fast collapsing core will collapse in 1 to 3 minutes when heated to 2500 degrees Fahr. A medium collapsing core will require from 4 to 6 minutes while a slow collapsing core will require 8 to 12 minutes. The heavier the casting thickness and weight, the slower should the core binder collapse.

Some core binders do not collapse of their own accord after being subjected to temperature of 2500 degrees Fahr. for a period of 12 minutes. When this is the case the core under test is crushed by applying a load. The load required to crush the core is termed *hot strength*. Cores for many large castings in gray iron and steel require a hot strength range from 3 to 25 pounds per square inch. Few liquid core binders possess hot strength. Some of the solid core binders, noticeably clay and bentonite, do possess hot strength.

The ease with which a core shakes out depends upon the retained strength of the core after the casting is poured and cooled sufficiently to shake out. Retained strength of a core binder is measured by heating test core specimens to various elevated temperatures and then cooling to room temperature after which the core specimens are crushed determining this retained compression strength. It is advantageous that a core binder possess no retained strength in that this feature will decrease the cost of core shake-out.

A.S.T.M. To Meet

Annual meeting of the American Society for Testing Materials will be held at Pittsburgh the week beginning Monday, June 28. Headquarters will be at the William Penn hotel. The 1943 spring meeting and committee week will be held in Buffalo the week of March 1.



Portable Torches that *Speed Up* Production

Insto-Gas light weight torches can be used either on the bench or floor for skin drying—eliminating time lost in handling molds. Insto-Gas torches are safe and can be used anywhere in the foundry—for preheating chills, core patching, emergency repairs on patterns, heating tools for waxing patterns, and making gate changes.

Insto-Gas is used by all types of foundries for there are five sizes of torches to take care of the smallest and largest requirements. The above picture shows the large No. 5 Insto-Gas torch skin drying a large mold. This torch will produce a flame 24″ long. Insto-Gas torches light instantly—no priming, no preheating, no pumping.

Insto-Gas is supplied in readily portable cylinders containing over 382,000 B.T.U. each. Distributors in principal cities.

Write for new folder, showing how foundries use Insto-Gas.

INSTO-GAS CORPORATION

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PLEASE SEND NEW FOLDER ON INSTO-GAS FOR FOUNDRIES.

Name_____

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BUICK SPEEDS PRODUCTION OF CYLINDER HEADS

(*Continued from page* 71)

ing area. To support the sand which spaces these fins, it is necessary to insert in the core 500-600 small pin wires, 0.041-inch diameter, and in three different lengths, depending upon the location.

In making the mold, sand is admitted to a depth sufficient to partially fill the channels between fins in the pattern. Then the operator proceeds to set the pin wires, which is a ticklish operation, inasmuch as they must not be pushed in far enough to come through the sand at the root of the fin and must be kept in line and equispaced radially. The wires come in sets of 2, 2½ and 3 inches length and are supplied to molders in special metal dispenser boxes, with three compartments serving to keep them lying straight and to minimize spillage. Proficient operators find that after some practice they can set as many as five or six of these wires at a time.

A word should be inserted here about preparation of the rocker box and combustion chamber cores. The former are blown on coreblowing machines, with a chill set in each core to speed cooling of the casting at a critical point. The combustion chamber and port core also is blown—in one piece—which is a new achievement in this type of work, other cylinder head foundries blowing this core in two or three pieces and joining them afterward. By dint of intensive study of wood models, Buick engineers worked out a method of blowing the core in two directions, around a center plug, leaving a hole about 1½ inches in diameter in the finished core.

Each group of six melting furnaces or pots serves three pouring lines, and each pouring line comprises a row of boards, each carrying five molds. A system of air pushers on the floor advances the mold boards toward the shakeout and moves unfilled molds into pouring position. About 4 hours elapses between pouring and shakeout.

Furnaces Oil Fired

Naturally the full battery of six pots is not operated at any one time, one or two being available for reserve. Pots are fired by oil burners set in a brick-lined steel outer shell. The pots themselves are of heat-resisting cast iron, limecoated on the inside to prevent any pickup of iron in the molten aluminum.

Furnaces are tipped electrically to fill pouring ladles which are kept hot by a special type of indirect heater, thermostatically controlled so that the ladles will not be heated beyond the pouring temperature. Ladles are moved from the furnaces to the molds on overhead tramrails. Each ladle has capacity enough to pour two molds. A test bar is poured from each heat of metal and immediately checked in the laboratory.

After cooling, the molds are broken open by removing the wedges and clamps, and the casting removed in a floor-level vibrating shakeout. No attempt is made to salvage the pin wires in the sand, but the two arbors in each half of the mold are broken out and reused.

The castings next are transferred to hooks on monorail conveyors and traverse a lengthy series of rough inspection, grinding, testing, cleaning and final inspection operations. Riser is sawed off in a bandsaw, and a ring cut from the last head in each heat for subsequent laboratory tests.

At the parting line of the mold a thin fin of metal remains on each casting, at right angles to the cooling fins. Special grinders were developed to remove this fin. The head is mounted on a fixture which indexes to permit a thin grinding wheel to be fed in between each cool-

NOPAK 3- and 4-Way Operating Valves to actuate single or double acting cylinders. Available in all standard sizes. For air or hydraulic service.

NOPAK Shut-off Valves for fast, easy finger-touch operation; quick or throttling action. ¼ turn opens or closes valve.

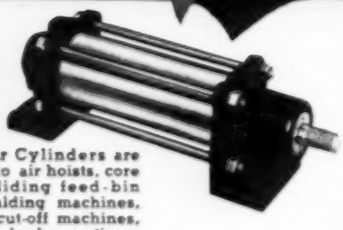
Conserve VITAL Air Power!

Don't let leaky air lines rob your compressors of their full rated capacity, or air powered tools of their top efficiency. Defective valves are a common source of air leaks, pressure loss. Replace leaky Shut-Off or Operating Valves with genuine NOPAKS. They're leakproof and wearproof, have no packing to wear out or replace. The perfectly lapped seal, between the patented cored-disc and the seat, actually improves with use — is constantly shielded from grit abrasion.

Specify NOPAK Valves to check pressure loss, to gain the full rated capacity of your compressors, reduce air costs.

GALLAND-HENNING MANUFACTURING CO.
2750 S. 31st STREET MILWAUKEE, WIS.

NOPAK VALVES and CYLINDERS
DESIGNED for AIR or HYDRAULIC SERVICE



NOPAK Air Cylinders are adaptable to air hoists, core blowers, sliding feed-bin doors, moulding machines, core wire cut-off machines, etc. Six standard mountings.

Write for Bulletins

NOPAK Valves—Hand, Foot or Solenoid operated — are described and illustrated in Bulletin 86; NOPAK Cylinders in Bulletin 82A. Both belong in your files.

Representatives in Principal Cities

A 3875-1P-A

ing fin to grind off the "vertical" fin. Because of the contour of the casting there are three sets of these parting-line fins which must be removed by grinding. The fixture used with the grinding wheel is built so that it can be swung to bring any one of the three faces square to the wheel. Thus all the operator needs to do is feed his wheel in to a stop, then index to the next slot and feed again. In a matter of minutes, this extra metal has been removed from between cooling fins and the casting is ready for further cleaning operations.

Before hand cleaning operations, the heads are passed through an airless shotblast machine, following which they are given a water test at 35 pounds pressure. Removed to another chain conveyor, the heads traverse a line of benches where a series of cleaning, burring, grinding and filing operations are carried out by operators with small, portable tools. Each bench is provided with a novel type of universal vise developed by Buick to hold the casting rigidly from the inside, permitting it to be swung to any position and locked. Expanding jaws in the vise head can be locked to hold the casting securely, while the entire head can be moved into various positions by means of a ball and socket joint in the base of the vise. Built at a cost of about $25 each, these vises are much less costly and do a better job than universal chucks used elsewhere.

Castings Are Heat Treated

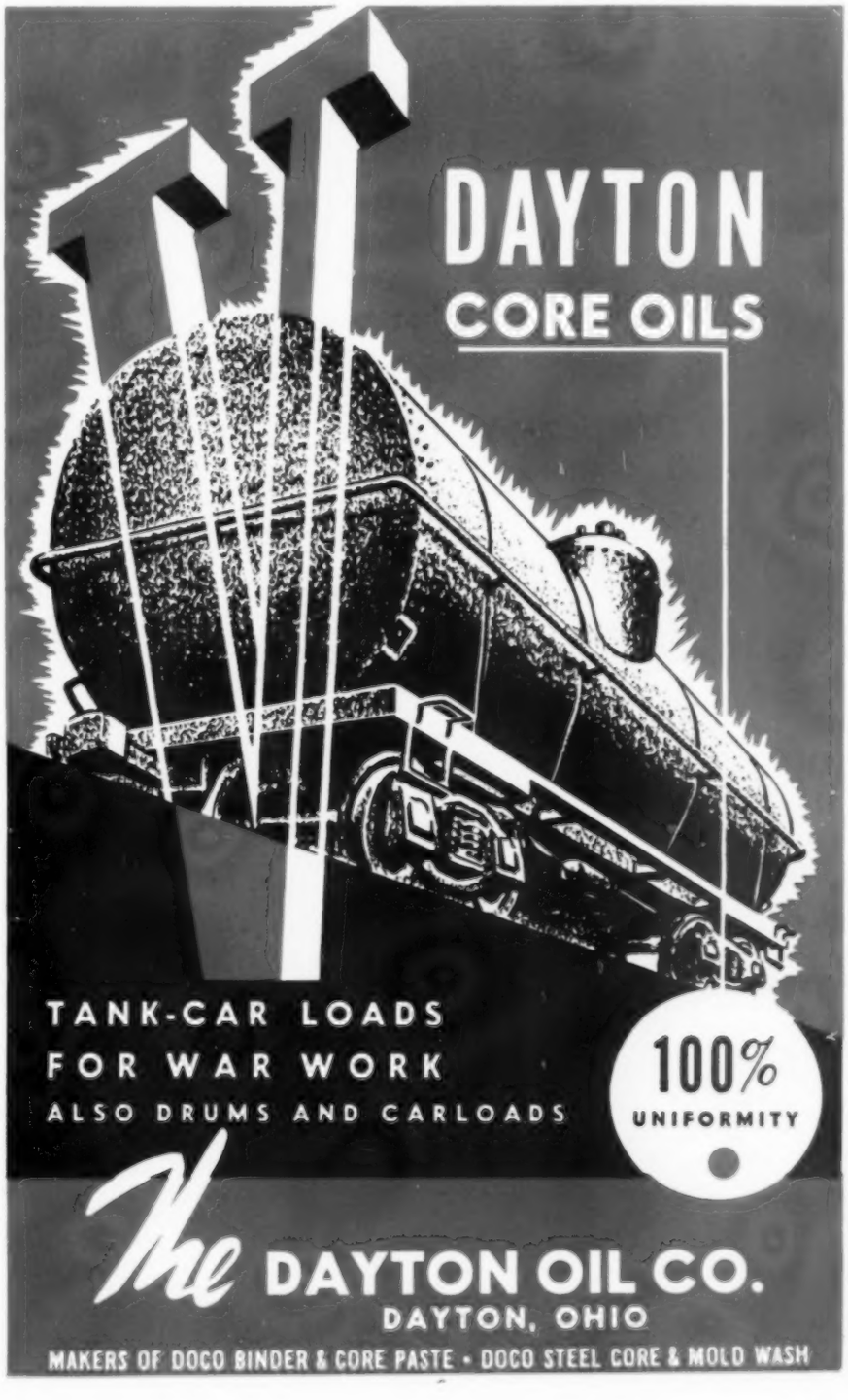
After these hand operations the castings are given another shotblast treatment and then transferred to racks for handling through heat treating operations. Electric furnaces handle the entire output of the foundry, with the aid of quenching pits to cool the loads between the two heat treatments. Solution heat treatment is at a high temperature, followed by air quenching and aging heat treatment.

All electrical controls for the battery of furnaces are carried in conduits set in the concrete subfloor to a central control room adjoining offices and laboratories. Here a separate controller is proved for each furnace and can be set to function automatically, while recording pyrometers give a continuous record of the operation of each individual furnace.

A third shot blasting operation is followed by final inspection and shipment. This, then, is the detail routing of castings through one of the four identical casting systems. Each system is served by a central sand system. Sand is shipped in by box car and is dumped through grates onto a belt which elevates it to concrete storage bins with capacity of 350 carloads, all under cover. Two types of silica sand are used, one a wash sand and the other about a No. 50 sand. Twelve mixing machines are provided to supply the molding and core-blowing machines, an overhead monorail crane moving the mixed sand from the mixers to machine hoppers.

All sand going to mixers passes through an electric weighing device with preset oil mixing valve which maintains a constant ratio of oil to sand. Practically no bond material is used, although a small amount of fly ash is added to facing sand. Permeability of the sand used is held around 65-70.

With requirements for many carloads of mixed sand a day under full operations, it was naturally advisable to provide some means for reclaiming sand from the shakeouts. This material can be used directly after collection, screening and milling for backing sand, or if desired it can be transferred to either of two 45-foot horizontal kilns where it may be burned back white once more. The burners discharge to a classifier from which the sand is moved to the proper storage bin. Perfection of this recirculating system of sand handling indicates that new sand requirements will be only



1½ to 2 cars of new sand a day under full operations.

Sand receiving dock, storage bins, mixing machines and related conveying equipment all are located on one side of the plant adjacent to the start of the molding and pouring lines. On the opposite side is the shipping conveyor which carries finished heads to the far end of the plant where they are packed in trailers or cars for shipment.

At the opposite end are located laboratories and offices for supervisory personnel. At each end of the plant complete equipment is installed for remelting scrap and casting it into ingots. Three furnaces and casting machines are installed at one end, two at the other. This avoids the necessity of trucking scrap the full length of the plant. Scrap is charged into remelt furnaces, oil fired, and is tapped directly into pig molds on the conveyor. Molds are all finned on the under side to speed cooling. Freshly cast pigs travel under a sheet metal hood, leading to an exhaust duct system. A high percentage of the aluminum cast returns to remelt. Each heat of remelt is analyzed chemically, and remelt pigs are charged into melting furnaces along with virgin material. Remelt ingots are easily recognizable because they are cast in somewhat different shape than virgin pigs.

Layout of the foundry building is somewhat unusual in that all employes, numbering 4000-5000 when at capacity, enter the same gate and proceed to the basement where a central corridor extends the full length of the structure. Off this corridor are numerous washrooms, toilets, showers and locker rooms, as well as a fully-equipped cafeteria and adjoining dining rooms, for both the working force and for supervisory personnel. Three stairways, one at the center and one at each end, provide access for workmen to the main production floor. With this system, employes move in orderly fashion through the basement entrance and up one of three stairways to their respective jobs, with a minimum of disturbance to other workmen. Main floor of the single-story plant measures 24 feet to the trusses, providing ample room for overhead equipment. Large area of window glass, of the new type which filters out infrared rays of sunlight but permits full light value to pass through, plus a generous installation of fluorescent lighting fixtures, provides good illumination throughout the plant.

Use Freight Elevators

Basement also houses extra stock rooms at each end, where supplies of aluminum pig, etc., may be stored to supplement stocks on the main floor. Spacious freight elevators are installed to move this stock to the working level.

At one end of the plant, adjoining offices and laboratories, is the maintenance and pattern shop, covering a section 120 by 240 feet in extent. The provision of patterns for this extensive aluminum casting operation is no simple task. Machines were set up in the former gray iron foundry building and the pattern program started almost before ground was broken for the new foundry.

Patterns are built up of machined and polished laminated sections of clock brass, inset into cast iron bases or plates. The latter are drilled from a master drill jig, so they are universally interchangeable.

Starting with solid 5/16-inch thick sheet brass, patternmakers coat surfaces to be machined with purple layout dye, then scribe the outline of the element thereon, referring to detail drawings and making extensive use of templates. Each individual fin, for example, is a separate element which must be carefully contoured and finished on diesinking machines, millers and other tools, then joined in proper sequence with other fins, each one being accurately gaged

Castings on the move

Whisk them through the Foundry;
Zip them through the Cleaning Room.

Use the following to shorten long jobs and eliminate unnecessary ones.

LION BINDER - A strong, fast drying paste; tie wires not needed. A strong binder that bakes very fast.

EASY CLEANER CORE COMPOUND - Makes cores that clean out of the castings readily.

VULCAN BLACKING - Can be adapted to swift application; gives good surface, cleans speedily.

DUST-ON FACING - Shake it on green sand molds, close and pour. No tooling. Fast cleaning.

SUPERIOR PLUMBAGO - Rubs in immediately; doesn't "lift" the sand - - peels beautifully.

SILKOTE - Paint or spray on steel foundry cores, dry sand molds and skin dried work. Adaptable to fast application. Casting surfaces are really clean.

Manufactured only by

J. S. McCORMICK CO.
PITTSBURGH, PA.
FOUNDRY FACINGS · SUPPLIES · EQUIPMENT

for position. The assembly is screwed together and bolted securely to the base plate.

In reviewing the layout, constructions and initial operations of this tremendous project, the observer is struck by the resourcefulness which its management has shown and with the speed under which they labored. These executives virtually were starting from scratch to launch a mass production operation on a product with which they were completely unfamiliar. They looked carefully at what was being done in other plants, then went back to their layouts and tried to make everything just a little bit better, more efficient and more productive.

Naturally they enlisted the services of hundreds of engineering experts in suppliers' companies, who collaborated night and day in perfecting new wrinkles in equipment, an improved system of handling materials, a time-saving short-cut in cleaning operations, a new gadget to facilitate untrained workers handling a precision job.

The record speaks for how well they succeeded. Many of the men working on the project spent 12 and 14 hours a day 7 days a week during the early stages of planning and construction, a killing pace. They are truly loyal soldiers on the production front.

Controlling Gray Iron Problems

(*Concluded from page* 142)

temperatures are especially important for the smaller and thinner as well as complicated work.

Pour rapidly into the molds. Do not excuse yourself using slow, cold pouring because the sand will not stand it. Get refractory, open sand that will stand hot and rapidly poured metal.

Summary. Here are set forth some of the important points to watch in making castings, especially cupola melted gray iron castings. Each one is important enough to control the success of difficult and important castings. Therefore, we cannot afford to disregard any one of these points in making castings anymore than a cook can be inattentive to each detail in making a pie. The fruit must be just so, the flour and shortening of the right kind and at the right temperature, the correct amount of sugar and butter is to be added carefully and at just the right time with just the right spices. Then the baking is done at just the right temperature and for a specific time. Attention to all these details does make a good pie. Carelessness with one detail makes just an ordinary or a poor pie.

American foundrymen must make castings under trying conditions today. These castings must not only have the right shape and proper soundness but also meet the wear, density, corrosion or strength requirements of the customer. The best foundrymen, however, do it with careful attention to details and thus enjoy a minimum of losses.

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This article is from a paper presented before a recent meeting of the Western New York Chapter of the A.F.A. The author is with the Development and Research Division of the International Nickel Co.

The Editors

Tempil Corp., 132 West Twenty-second street, New York, has published a chart 18 x 23 inches which contains information on the proper preheating temperatures for welding of numerous ferrous and nonferrous materials. Compositions and designations of many of the materials are included.

Milwaukee Chills have passed the rigid inspection of foundrymen who demand the best. These Chills have been improved to accelerate cooling, insuring sound castings free from internal shrinks and surface checks. They will also prevent molten metal from cutting into the sand. These Chills will cut scrap losses, and reduce welding and cleaning costs.

Ask for samples and prices on Milwaukee Thread Stem Chaplets . . . . Standard Radius Chills . . . . Schmitz Chaplets . . . . Patented Adjustable Radius Chills . . . . Other Chaplets and Foundry Supplies.

Milwaukee
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MILWAUKEE WISCONSIN

FEATURE CASTINGS AT METAL SHOW

(*Continued from page* 73)

sions held in connection with the meeting several were of direct interest to foundrymen, and were a part of those termed "War Products Group Meetings". One held Monday night, Oct. 12 related to the "Manufacture and Heat Treatment of Magnesium Castings". The session was presided over by Chairman A. W. Winston, Dow Chemical Co., Bay City, Mich., and consisted of a series of short discussions by a panel of experts which included William F. Rose, Wright Aeronautical Corp., Paterson, N. J., who spoke on foundry sand; M. E. Gantz, American Magnesium Corp., Cleveland, who discussed cores; M. E. Brooks, Dow Chemical Co., Bay City, Mich., who described melting and pouring technique; R. T. Wood, American Magnesium Corp., Cleveland, whose topic was heat treatment, and L. E. Pearch, Wellman Bronze & Aluminum Co., Cleveland, who discussed inspection. At the close of the meeting V. N. Krivobok, Lockheed Aircraft Corp., Los Angeles, made a brief summary of the important points brought out by the speakers.

In the discussions it was pointed out that green sand for molding magnesium must be selected with care to obtain desired properties, and that close control is an essential feature to obtain sound castings. In green sand molding inhibitors must be used to prevent reaction between magnesium and moisture. Those include sulphur, boric acid, ammonium bifluoride, diethylene glycol, etc. Ordinarily the green sand will contain 1½ to 4 per cent moisture, and have a green permeability of 40 to 100 depending upon casting size, a shear strength of 4 to 9 pounds, and its dry tensile strength should not be too high. Inhibitors also are used in dry sand cores, and when sulphur is used the baking temperature must of necessity be lower than the melting point of sulphur. Cores in which diethylene glycol is used as the inhibitor must be kept warm until used since the material picks up moisture. Since cores must possess good knockout properties many binders are not suitable. Work is being done on use of synthetic resins as binders, and indications are that they will overcome some of the difficulties.

Inspect the Pots

Magnesium is melted in and poured from steel pots or crucibles which may be cast or fabricated. The pots must be inspected regularly to see that they are sound. Furnace settings must be kept free from iron scale since molten metal from a leaky pot will combine violently with the scale to give a thermite reaction. Scaling of pots can be minimized by coating with aluminum before use. The aluminum can be sprayed on, and then the pot is raised to a high temperature to form an aluminum-iron layer. Molten metal must be protected at all times with a cover flux to prevent burning. In pouring, the crucible never should be emptied completely otherwise the small amount of sludge in the bottom will be carried into the mold. In the discussion of heat treatment, it was pointed out that it was an American development rather than a German one, as many believed.

Another session devoted to "Problems Associated With the Large Expansion of the Steel Foundry Industry", was held on Wednesday afternoon Oct. 14, and presided over by Chairman Frank G. Steinebach, The Foundry. The discussion panel was comprised of Fred A. Melmoth, Detroit Steel Casting Co., Detroit, whose topic was obtaining melters and molders; Elmer Reynolds, Federal

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Security Agency, Cleveland, who spoke on apprentice training; W. J. Phillips, Symington-Gould Corp., Rochester, N. Y., who discussed converting cupola iron to steel; A. W. Gregg, Whiting Corp., Harvey, Ill., who described duplexing and triplexing, and C. S. Pearce, Porcelain Enamel Institute, Baltimore, Md., who spoke on conversion of idle furnace equipment to heat treating steel castings. At the close of the session C. W. Briggs, Steel Founders' Society of America, Cleveland, outlined the high points of the various discussions.

According to the speakers converter steel production cost was about one-third that of other methods, the process is extremely flexible, permits accurate control of analysis, allows use of any kind of scrap, and produces a high quality product through control of oxidation during blowing. Refractory costs are high, operators cannot be trained as rapidly as for some other processes, and occasional cold blows are encountered due to wear of converter lining. Cost of cupolas and converters to produce 150 tons of steel a day was estimated to be around $30,000. Use of soda ash in the ratio of 25 pounds per ton of metal would reduce sulphur from 0.100 per cent to 0.025 per cent in about 8 minutes. Use of the triplex process including cupola, converter and electric furnace will produce steel at an overall cost of about $10. a ton. Deoxidation loss runs about 15 per cent, but can be reduced to some extent. From 40 to 60 blows can be obtained from a converter before relining is necessary. In the smaller converters, 1 and 2 ton, a monolithic lining generally is employed while in the larger type, 6-ton, the lining is brick. Conversion of idle porcelain enameling furnace to heat treatment of steel castings is being accomplished successfully not only for normalizing but also for intricate heat treatments.

Scrap Old Foundry

An estimated 120 tons of iron and steel scrap recently was requisitioned by the WPB, at the old Carroll Steel Foundry Co. plant, Houghton, Mich. Included among the equipment, scattered in the company's yard, was a large obsolete lathe, said to have been used to turn the turret for the famous Union Ironclad, Monitor, which fought the Confederate Ironclad, Merrimac, in Hampton Roads, during the Civil War in 1862.

The requisition, authorized by William McCaw, chief of the requisition section, Material Redistribution Branch of the WPB, in Washington, was serviced on receivers of the Carroll Foundry by U. S. Marshal Dewey L. Hanson, Marquette, Mich.

According to WPB, the foundry has not been operated for more than ten years. Its main building was torn down several years ago.

Issues Bulletin

Calcium Chloride Association, 4145 Penobscot building, Detroit, recently has issued a bulletin describing the use of calcium chloride in fire barrels and fire pails to prevent freezing of the water which they contain. Addition of 2 pounds of flake calcium chloride per gallon prevents freezing down to 10 degrees Fahr. while 3 pounds per gallon prevents freezing down to 10 degrees below zero Fahr. Containers should be painted inside with asphaltum.

Cooper Alloy Foundry Co., Hillside, N. J., just published a bulletin giving the analyses, characteristics, and applications of the various alloy castings it produces. In addition to the firm's designations for the alloys, designations of other organizations such as Alloy Castings Institute, American Society for Testing Materials, Society of Automotive Engineers, etc., are given.

J-M *Announces*

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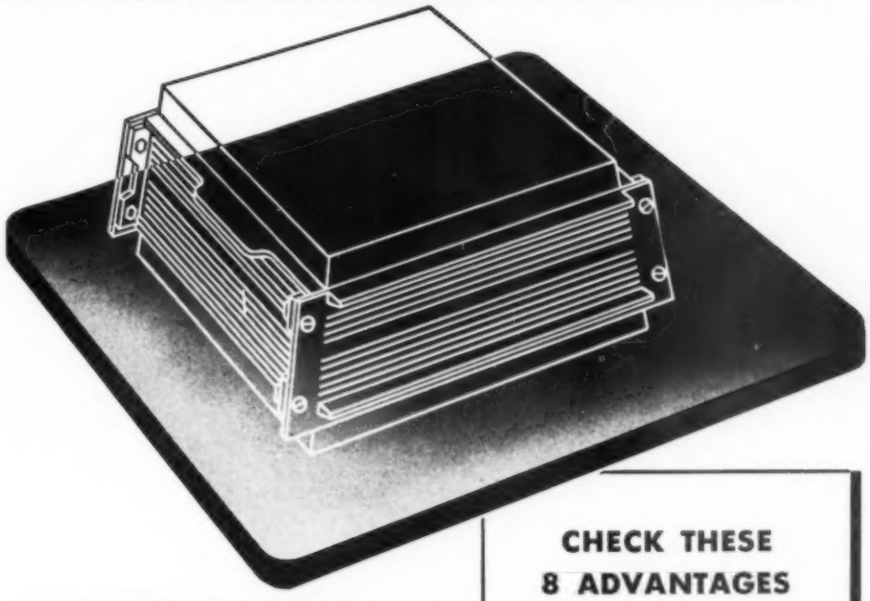

HERE'S WELCOME NEWS for foundrymen! The makers of Transite Core Plates now bring you a companion product—Johns-Manville Foundrite Bottom Boards. These new, improved bottom boards, made of asbestos and high heat-resisting bonding agents, offer you eight important advantages—listed at the right. Throughout the pouring operation they provide a uniform foundation for the mold.

By reducing breakouts due to mold failures, they help safeguard production schedules and improve foundry practice. For complete details, write today for brochure No. PP-10A. Johns-Manville, 22 E. 40th Street, New York City.

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6. Easy to Clean
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8. Non-Critical Materials

JM PRODUCTS

Johns-Manville

FOUNDRITE Bottom Boards

LOOKS AT FOUNDRY INDUSTRY

(*Continued from page 74*)

opportunity than one who worked his way up."

2. "No foundry jobs were offered to us."

3. "Our foundry course is a laboratory course, not an introduction to a career. It is accepted by most students as one more required course. It introduces a student to manual labor methods, and they are not important for him."

4. "I never saw any literature about the foundry industry."

5. "The industry seems still to be run by the old practical men with no regard for modern engineering methods."

6. "I don't care for all the dust and dirt."

7. And, over and over again, simply "I'm not interested.

And the third question: *Do you know as much about requirements and opportunities in the foundry industry as you know about the requirements and opportunities of the electrical manufacturing, utility, automobile, aircraft, chemical, etc. industries?*"

This showed that 161 out of 185 seniors who were questioned, or 87 per cent, answered "No."

Perhaps the title of this paper ought to be rather "The College Graduate Does *Not* Look at the Foundry Industry."

Of course, all this does not result primarily from the indifference of foundrymen; it results in large part from unavoidable working conditions in the foundry industry.

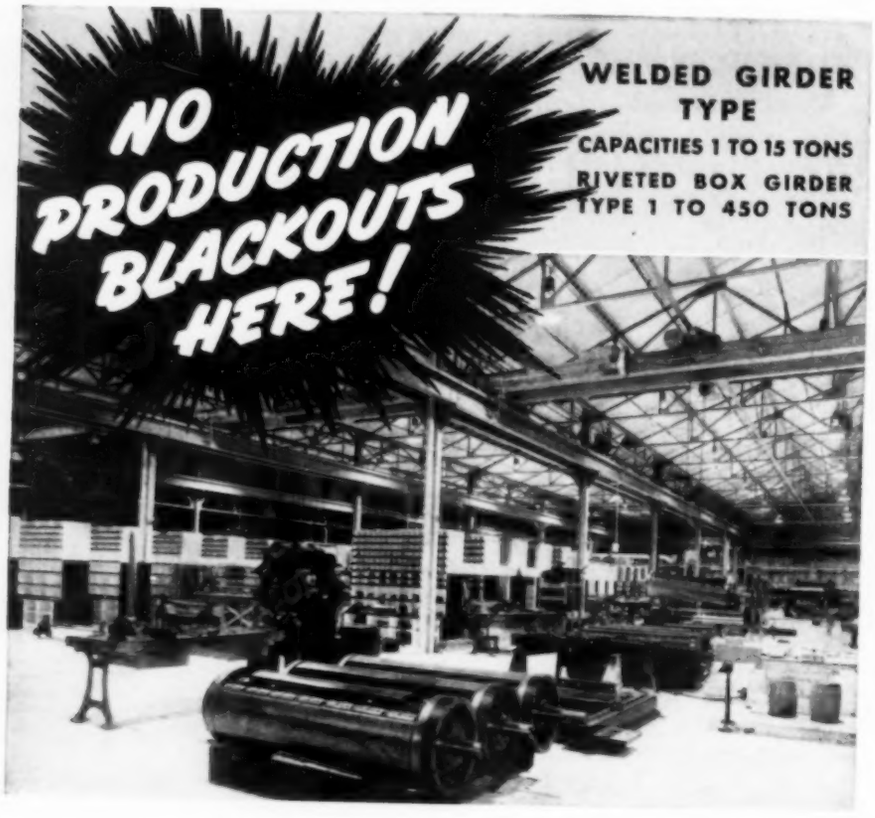
In the American college the student becomes used to a reasonably comfortable mode of life. Furniture in the dormitories and halls is good enough. Ventilation, lighting and heating, are better than in most homes. Although there are very much more college students than there were 20 years ago, the college student still belongs to a selected class, an elite, and he instinctively knows it. He looks forward to a career of business or professional type, to be spent in an atmosphere of clean windows and corridors, and good furniture in a handsome office. He thinks these are the heritage of his education. They may not be essentials, but they stand out sharply when a young man—and his mother and sisters—are thinking about his life work.

Has Little Appeal

The foundry, on the other hand, cannot be comfortable or elegant. In spite of great progress, a foundry is still a noisy, hot, dusty place. It will be a long time before a melting platform or a pouring floor looks like a broker's office. The din in the cleaning room is still terrific, and a shake-out is still—well, it's still a shake-out. You cannot blame the boys much for not rushing into the foundries. The industry does not have the slightest appeal except to a few students of metallurgy, and to still fewer students in other fields who take a certain pride in being rugged and tough, the sort who go into seafaring, oil producing, mining and the like.

Foundrymen who wish to enjoy the advantages of college training in their plants will need to bestir themselves because shop conditions in their industry are a severe handicap in comparison with other industries which compete for college graduates. Foundry indifference toward colleges and universities is surely to no purpose.

But perhaps we are taking too much for granted. After all, is there a place for the college man in the foundry craft? Before getting disturbed about college graduates in the foundries, we might well inquire if they belong there.



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I believe there is work to do for the college trained man in the foundry, important work, and apart from the field of metallurgy. He has accomplished marvellous results in metallurgy and furnace operation by careful and intelligent instrument work and measurement, control of temperatures and fuels, precise analysis of materials and systematic recording of data. Why should he not accomplish as much on the foundry floor? Molding, coremaking, cleaning are still to a large degree on a trial and error basis. Some years ago, in the annual apprentice competition of the American Foundrymen's Association, two contestants each made perfectly acceptable castings. One had more than half the weight in risers, and other had no risers at all. And both were employed in well known and reputable plants. This sort of thing obtains not merely in molding but in practically all foundry operations. What a happy hunting ground for a resourceful, enterprising young engineer!

Must Acquire Skill

But of course, the college man must acquire work habits and skills for which college studies are no direct preparation. For one thing, he must learn to think quickly. He must make instinctive and instantaneous decisions, like the decisions made in emergencies by masters of vessels, bosses of timber crews and chiefs of power plants. Such decisions are based on experience, not on intellectual analysis. When a mold runs out or a nozzle freezes, there is no time to undertake a research to determine what to do. The boss on the floor must know what to do to correct the trouble and must do it right away.

In *Time*, for March 23 of this year, there is an excellent description of men of this type: "With dog eared note books, pencil stubs and know how, they work out production problems that no textbook could solve . . . . They do not come ready made; they have to grow up with the machine." It takes years of experience to produce such men and the young college graduate does not always have years of patience to acquire that skill.

I once knew a young man who began to learn the foundry business from the bottom up. He had A.B. and M.E. degrees. He learned something about molding, coremaking, cleaning castings, pouring, oven operation and melting, the building and maintenance of furnaces. But after 2 years of labor he felt that he had barely made a start and he saw years of preparation still ahead of him. Just then he was asked to become assistant to the plant engineer, and to nobody's surprise, he accepted.

In spite of these obstacles, there is still room for the college man on the foundry floor. The very circumstances which tend to keep him out of the foundry constitute his greatest opportunity. He objects that operations are on a rule of thumb basis. They are, largely. But who can standardize operations better than he can?

Now, what is to be done to attract more college men into the industry? First of all, I should think that foundry instructors in the colleges could rather easily give to foundry technique a greater scientific color and character. I may be mistaken, my judgment is woefully fallible, and I recognize many foundry instructors who are most progressive, but I wonder if too many instructors have not failed to change with the times. Thirty years ago engineering inclined toward the practical. Engineers and engineering teachers pooh-poohed theory, and master's and doctor's degrees. But theory and science have suddenly become most important, and engineers have taken them seriously or have fallen hopelessly behind their more alert fellows. And some of the foundry instructors have not seen the light. Their courses are still emphatically shop courses. They still wink at each other when they hear the word "theory."

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They must change their methods. They must get busy with research in foundry technique; in gating and risering, for instance. They must study and investigate and—yes—publish. Operations must be standardized. And they can be. Convincing proof is, for instance, the handbook on cutting metals of the American Society of Mechanical Engineers. So are the design data published for all airplane manufacturers by the Civil Aeronautics Authority.

Military techniques have been thus standardized. In the last war, a number of New York police sergeants and a number of Texas Rangers joined an infantry regiment of which I was a member. They scoffed at the *Small Arms Firing Manual of the United States Army*. Shooting was something, they said, which could not be learned from books; one learned to shoot by shooting, all one's life. But before long the best shot in the batallion was a former professor of modern languages at Columbia University who had never fired a rifle in his life, but who carefully read what the manual had to say, and carried out the instructions to the letter. Foundry technique can be similarly organized.

College foundry departments now lack dignity, and the students instinctively sense that lack of dignity; they don't respect the foundry laboratory, and they won't until they see in it more of science and scientific procedure.

If the American foundrymen wish to enjoy the advantages which other industries have gained by introducing college techniques and college men—advantages which they themselves enjoy in their melting and metallurgical departments—they should begin by setting up graduate training programs for college men in their shops. These should be highly organized, not unlike the familiar apprenticeship or test courses in the larger manufacturing corporations. Foundrymen must determine the content of such training, and organize that content as formally as a college curriculum. They must organize the method of administration and select the individual who will be in charge before the first young college boy is engaged. And they must determine which jobs in their plants may advantageously be held by college men, and hire just enough college boys to fill the need, allowing for inevitable turnover, and no more.

Method Is Too Slow

And the program must be interesting and worth while. Forgetting the college boy is fatal. He must be groomed, watched, encouraged, talked to. Sometimes foundrymen hire a college graduate or two and promise to break them into the business. The boys may start out running stock core machines: "They might as well learn the business from the bottom up." Nine months later the boys are getting dissatisfied and we go out to investigate. They are still running the stock core machines. We protest to the boss and he answers petulantly, "Well, they can work their way up, can't they? I did." Yes, they can, but they won't; not that slowly. Times have changed, and that particular boss, at least, had better take a look around and inform himself, and revise his viewpoint and his methods.

The boys must make just progress enough to maintain their interest; and they must be paid enough to meet the competition of other jobs.

In spite of its handicaps, the foundry has at least one great vocational advantage, and that is its wide open character. One time, when I was still in the industry, a young man came and asked for a job in the foundry. He had just graduated in engineering at Dartmouth. He was well dressed; his manners were excellent; he was clearly used to the finer things of life. He did not appear rugged enough to survive in the foundry, and I tried to persuade him to enter some other department of the plant, but he refused to consider anything else. Finally I said, "But very few college

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men go into the foundry game." And he answered, "I know that; it's my point exactly. If I go into the foundry I won't have to compete for promotion and opportunity with half a hundred other college graduates who have had as good training as I have had. I should get on faster there." That will be true for years to come, and it might interest others of our best young men.

Manning Table Plan Lists Jobs

Manning Table Plan, announced recently by the War Manpower Commission is based on an arrangement developed by the Carnegie-Illinois Steel Corp., over a period of several months, in an effort to provide for orderly withdrawal of men from industry and to establish a sound basis upon which deferments may be requested.

Major purpose of the plan is to indicate the form in which the employer should keep the records of his labor force so as to provide a basis for planning the withdrawal of workers from industry into the armed forces with the least possible disturbance to production.

For one thing it will give the plant a complete inventory of its manpower, showing the number of workers necessary to do each kind of job, the possibility of substituting unskilled for skilled workers on certain jobs with accompanying savings in wages, the amount of training necessary for each job, and the training methods which might be used.

Under present conditions the plan will be a voluntary co-operative system. Only plants engaged 75 per cent or more in war production and certain other industries such as public utilities and railroads qualify for the plan. It also will be possible for associations to enter into the plan and act for industry as a whole.

Any plant which can qualify under the plan and which wants to participate must fill out WMC Form 500. This form then should be mailed to the office of the regional or area director of War Manpower Commission in whose territory the plant or activity is located.

If the request is granted, the director concerned will forward to the company sufficient material and instructions for compiling the manning tables. The company must then construct its manning table, which is a listing, with appropriate supporting data, of all different kinds of jobs in the plant. The table describes skill, training and experience needed by the workers to fill each job. It also shows essential characteristics needed by each worker for each job and the estimated length of time required to train a replacement for each worker.

War Manpower Commission emphasizes the fact that this is not a listing of personnel, but a listing of jobs. This is quite important inasmuch as the correlation of the Manning Table Plan with Selective Service does not provide deferments for individuals, but deferments for jobs, and as a result, for the individual who fills that job. It is suggested that the description of the job may be made easier by the use of the Dictionary of Occupational Titles, compiled by the United States Employment Service.

Certain other information also must be supplied, including number of jobs which are filled by handicapped persons and the probable number of additional employes needed. The manning tables will be kept current by periodical review.

After the manning table has been set up and approved by the regional or area director of War Manpower Commission, it is then presented to the state director of Selective Service of the state in which the plant is located, and if acceptable, is then approved and the table is given a state acceptance number. The employer then is authorized to use this state acceptance number and to place a prescribed state acceptance stamp on the affidavit (Occupational Classification, Form 42-A). This affidavit is to be filed with the draft board.

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COAL STOKER FOR CORE OVENS

(*Concluded from page 75*)

alone amounted to $2.17 per ton of good castings which, of course, does not take into consideration the even heat obtained which enables the plant to secure better dried cores and molds.

It is most desirable that each oven be equipped with the best thermostatic controls that can be bought. One might as well not have automatic heat if the equipment is operated with inferior controls. It is also desirable to have recording temperature meters. It is rather nice to know each morning when you get your temperature charts just what was going on in your oven over the preceding 24-hour period. And, too, a recording chart will prevent someone from changing the setting of the thermostatic controls for a few hours, just long enough to ruin an oven of cores, without your knowing what happened.

As previously stated, the installation of our stokers was not very difficult. The rebuilding of the fire boxes to accomodate the stokers was the major change necessary. Fig. 1 shows a cross section through the firebox of the oven ready for stoker installation. All the ovens are of such size that two stokers are used for each oven. The main reason for this is that all the ovens have two tracks in each and for each track there was a fire box and a heat distributing chamber. Consequently we did not go to the expense of changing the general design of the ovens but merely installed a suitable size stoker for each fire box.

Both stokers in one oven are operated from one temperature control system. Sections *AA* and *BB* of Fig. 1 show that from the fire box back the bottom slopes upward to the end of the oven opposite the stoker. This was done for two reasons, namely to conserve the heating area below and still have the heat all come up under the cores the full length of the oven; and to make it easier to clean out this heat distributing chamber.

Prefer Hopper Type

Fig. 3 merely shows the stoker in place. In some cases it might be advantageous to install the bin type stokers, but in this case we chose the hopper type. The pits were rather small and, since it is necessary to remove the clinkers daily, the extra cost for filling the hoppers with coal was very little.

The maintenance cost on the stokers has been practically nil, considering the time they have been in and the service rendered. Practically all this maintenance has been on the electrical equipment and, considering the dust, dirt and heat that these motors must combat, we have not felt that we had any reason for complaint.

Authors Note—The reader should bear in mind that this article was not written with the idea of trying to say which type of heating is the most desirable for core ovens. Far from it, for each type of heating has its advantages for core drying, depending upon numerous contingencies.

Spectrum Chart

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has published a new spectrum chart of special interest to teachers of physics, chemistry and electrical engineering, and to practicing engineers and scientists. It is a 7-color wall chart of entire electromagnetic spectrum, printed on heavy white cloth, 30 x 40 inches in size. Every part of the spectrum of practical significance is analyzed in detail. Emphasis is placed on each kind of radiation, and spectral terms are defined in a glossary. Copies of the chart may be obtained for $2 from the publications section of the Westinghouse Co.

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REQUIREMENTS FOR MACHINE TOOL CASTINGS

(*Continued from page 78*)

By pouring metal through a number of small gates the mold is filled rapidly and uniformly while the face of the mold at any given point is not over heated or eroded.

Another important factor in the production of clean, firm molds, and the consequent production of clean, smooth castings, is a battery of continuous ovens in which all molds with the exception of those made in snap flasks are dried. The ovens, equipped to be fired with either oil or gas, are arranged in three groups to handle molds in three sections of the foundry. One group of three ovens takes the largest molds. A second group of four accommodates molds in the medium size range. The third group of four ovens dries all the smaller molds. Operation of these ovens is claimed to represent the highest development in this phase of foundry practice. The ovens are open at both ends and are divided into three zones with the maximum temperature heating zone in the center. The zones are divided not by material partitions, but by air seals, thin sheets of cold air driven by powerful fans. The molds are heated gradually in the entering zone, exposed to a temperature of 850 degrees Fahr. in the central zone and cooled in the third zone. When they emerge, the temperature has been reduced to a point where the assembly operators can work comfortably while setting the cores. The face of the mold is dried to a depth of approximately ½ to 1½ inches. This is quite sufficient, since the molds are poured shortly after they are closed and before moisture from the backing sand has a chance to work toward the surface.

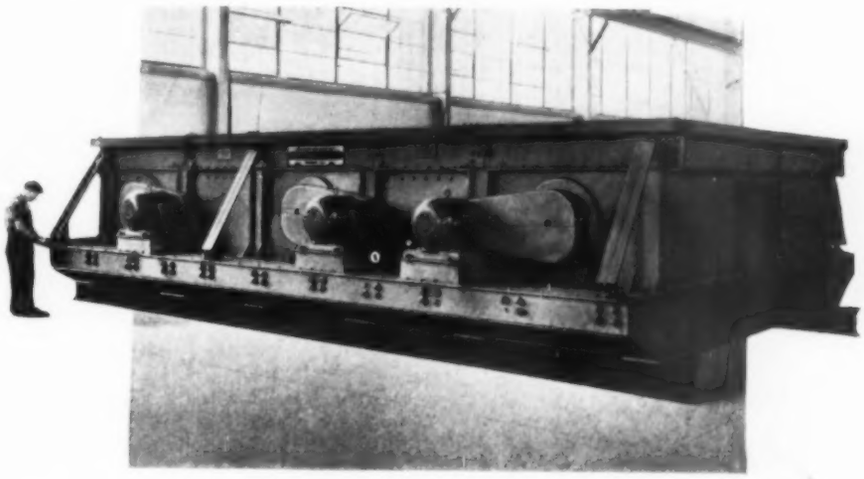
Molds Dried Quickly

One of the incidental advantages of this method of drying the molds, is the reduction of time in shaking out the molds and in reconditioning the sand. Another is the short time the molds are in the oven, the largest molds requiring only 2 to 3 hours.

Molds for long grinder bed castings are made in a concrete pit in the floor. The pit, 6½ feet wide and 6 feet deep has a total length of 90 feet and is provided with vertical slots in the walls spaced 6 feet apart for anchoring cast iron bulkheads. With this arrangement from half a dozen to a dozen molds may be in process of construction at the same time. A semipermanent coke bed remains in the bottom of the pit with vent pipes projecting above the surface of the four corners of each section.

The pattern is lowered into place and the sand is hand rammed under and around the bottom. A sandslinger mounted on a track which parallels the pit then packs sand in the space between the pattern and the side and end walls of the pit. A wide core print extends around the top of the pattern to eliminate the need of a cope. The pattern is removed and the face of the mold is finished, blackwashed and dried. A pipe frame pierced with a number of small holes and conforming approximately to the inside contour of the mold is placed a short distance above the bottom of the mold and connected to a gas main. The gas is lighted and the mold is covered until the face is dried properly. The cores forming the inside of the mold are provided with extensions which rest in the core prints left by the pattern. Thus they are supported in proper position and also serve as a cope. The molds are gated top and bottom at each end. Blacking compound sprayed on molds and cores is checked every day with hydrometer to determine proper specific gravity.

The large coremaking department extends across the west end of the found-



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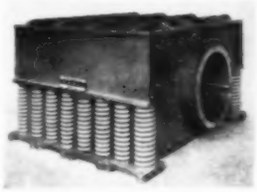

FOR MATERIAL AID IN MATERIALS HANDLING
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ry with two muller type mixers close to the sand supply at the north wall, and three sandslingers close to where the active coreboxes are stored on the opposite gangway. The mullers are mounted 6 feet above the floor and immediately below automatically operated loading chutes which deliver the sand and other ingredients for each batch. The prepared sand falls into steel boxes and is delivered by monorail to the sandslinger hoppers and to a number of individual benches where certain types of the smaller cores are rammed by hand. Method of handling the large and medium size cores on conveyor lines and through two special rollover machines was described in a previous article. Two pneumatically operated machines, similar in general principle to the car dumper on Great Lakes docks, turn the loads over and remove the coreboxes. The section of roller conveyor top and bottom, grips the corebox and plate firmly and eliminates the use of the usual clamps. All core plates are heavy cast iron, substantially ribbed on the back and planed on the face to insure a true and level surface.

The largest cores are dried in three vertical type continuous ovens equipped with swinging shelves which carry the cores upward through a preliminary heating and moisture removal zone, through a maximum temperature baking zone and then through a decreasing temperature and cooling zone, to an opening opposite to the point of entry. The cores then are blackwashed, gaged and in some instances pasted or made up in sub-assemblies and then passed through a horizontal type continuous oven to dry the paste and blacking. From this point the cores are taken by crane to the mold assembly floor where they are placed in the molds.

A section of the foundry floor 25 x 40 feet divided by a gangway near the cupola is devoted to the production of cast iron arbors used extensively in the larger cores. The sand bed is maintained neatly inside channel iron retaining walls 10 inches high. After one batch of arbors is removed the sand is sprinkled with water, turned over, and then scraped to a level surface by a straightedge riding at the ends on opposite walls.

Cupolas Operated in Pairs

A battery of four cupolas operated in pairs on alternate days supplies all the metal required for the castings, divided into three general classifications. The cupolas are constructed and operated to melt iron according to the latest developments of the Meehanite process in which the addition of calcium silicide at the spout and steel scrap in amounts varying from 10 to 80 per cent in the cupola charge, imparts special physical properties to the resulting metal. Iron is melted continuously 20 hours per day.

While actual production figures, due to war time restrictions, are not available for publication, it is interesting to note that the lining at the melting zone at the beginning of the heat is 18 inches thick, the coke bed is 70 inches high, the blast is delivered at 5000 cubic feet per minute and at a pressure of 32 inches on the water gage. Total height of each cupola is 49 feet, with a distance of 20 feet between the sand bottom and the charging door.

A centrifugal type blower, equipped with automatic devices for controlling volume and pressure, in accordance with climatic conditions, delivers air to either one of each pair of cupolas as required. The blowers are mounted on opposite sides of the charging floor. Air is taken in through a pipe extending through the roof and is delivered through another pipe which extends down to the wind belt surrounding the cupola in the vicinity of the tuyeres. A monorail hoist with suitable switches permits the operator to deposit charges in any of the four cupolas.

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overhead crane loads a double row of bins facing a depressed track area close to the outside north wall of the foundry in the vicinity of the cupolas. Two electrically operated scale cars run on parallel tracks in the depressed area and convey the materials in charging buckets to a point where they can be reached by the cupola charging hoist which places the charges in the cupola. Commencing at the far end of the depressed track the operator of the scale car spots a steel charging bucket under each bin in turn until his load is completed. The bottom of each bin slopes sharply toward the opening so that the operator with only slight effort and armed with a steel rod hooked at the end, can pull the material forward and into the bucket. A scale on the car registers the correct amount of the different materials. When loaded, the bucket holds a complete charge, 1500 pounds metal, 250 pounds coke and 50 pounds limestone. Relative amounts of pig iron, steel, foreign and domestic scrap vary according to the physical properties of the castings into which the metal is to be poured. Cast iron briquets, made on the premises make up part of the charge in amounts varying from 10 to 30 per cent.

Iron and slag run continuously through the tap hole of the cupola. The iron runs under a dam which extends almost to the bottom of the spout. The slag flows over a bridge at one side of the spout and then accompanied by a small stream of water falls through an opening in the operator's platform and into a steel container resting on a skid located on the same floor as the cupola legs. Through action of water and heat the slag is in a practically granulated condition when the loaded containers are dumped. Up to the present all the slag has been utilized to grade the property in the vicinity of the foundry

This is the second and concluding article on methods and equipment employed in the new gray iron foundry of the Cincinnati Milling Machine Co. The first appeared in the November issue of THE FOUNDRY.

THE EDITORS

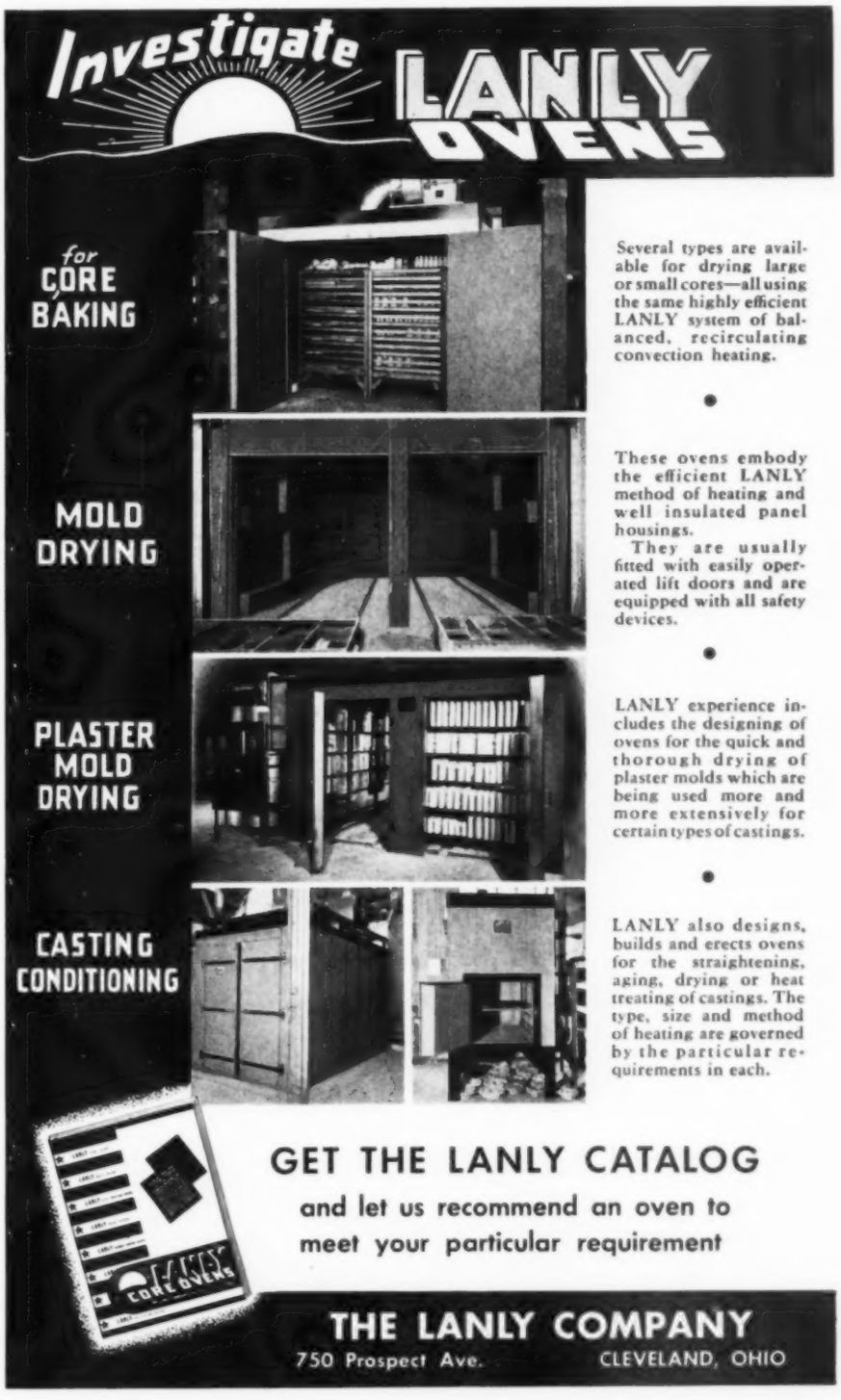
Book Review

Plant Engineering Manual, compiled by E. Molloy, fabricoid; 231 pages 5 x 7½ inches; published by Chemical Publishing Co., Inc., Brooklyn, N. Y.; price $3.00

Information in this pocket book is designed to provide the plant engineer with a convenient source of reference upon all the main aspects of engineering, mechanical and electrical, likely to be encountered in his everyday work. The material is presented in four sections. Sources of power, transmission of power, plant and equipment, efficiency in works and factories.

The first section covers factory electric supply, alternating current and direct current motors, steam engines and boilers, steam boiler performance, steam valves and fittings, steam, water and gas piping, diesel engines. The second section deals with transmission notes, belt and rope drives, roller chain drive maintenance, brake linings, clutch linings, lubrication. Items in the third section include pumps, air compressors and equipment, electric furnaces, electroplating plant, welding shop. The fourth section is devoted to modern factory lighting, emergency and standby plant, ventilating and air conditioning, fans, electricity tariffs, power factor, staff locating systems, tables and data. A three page double column index is provided.

Lake City Malleable Co., Cleveland, recently has issued a 12-page pamphlet illustrating a number of conversions from other materials and methods of fabrication to malleable cast iron. Each illustration contains information on the reasons for the change.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EQUIPMENT MEN CONSIDER WAR PROBLEMS

(*Continued from page* 80)

industry to provide maximum service to the American war effort. The president also described the work of Arthur J. Tuscany, executive secretary of the association, in connection with the Washington scene.

In the first paper of the meeting, J. K. Johnson, regional office, War Manpower Commission, Cleveland, discussed "The Manpower Problem—Today and Tomorrow." Mr. Johnson stated that industry cannot possibly hope to retain many of the men they considered necessary 6 months ago. To fill in the needs, industry must make maximum use of men above the military age, of women, of the handicapped, and of the wounded who have been returned to civilian life. Other proolems facing industry include training, pirating, turnover, and absenteeism.

J. C. Diebel, regional chief, Industrial Salvage Section, Conservation Division, WPB, Cleveland, in stressing the importance of the organized salvage effort, stated that we cannot win the war if we do not have the materials to give the boys on the fighting front and that we cannot have these materials unless we have sufficient quantities of scrap. He stated it was the duty of every manufacturer to go over the plant and to get the materials moving to the scrap piles if they have not been used for some time and probably will not be used in the near future. A talking film, shown in connection with this talk, stressed the idea that if a machine or material has not been used for three months, and it will not be used for the next three months, "find a use for it or scrap it."

At the noon luncheon, Earl L. Shaner, president of the Penton Publishing Co., publisher of THE FOUNDRY, spoke on "What Lies Ahead for American Industry." In opening his remarks, Mr. Shaner paid tribute to the magnificent way in which the manufacturers of foundry equipment have met every challenge of the rapidly expanding war production program. Future success of all industry will require more efficient management, according to Mr. Shaner. First of all, management must get along with manpower that is much less efficient.

More Help Needed

As this problem of manpower becomes more acute, men and women who never have had any contact with industry will be employed at the bench and the machine. The impression which these temporary employes form of industry will depend much on the ability of management. For instance, when it is considered that these people will have much to do in deciding whether we will have private enterprise or some other form of economy in the post war period, the importance of this phase of the management problem is apparent. In discussing the post war period, Mr. Shaner stated that in his opinion it is not proper to do any freezing of plans while the problems are so indefinite. Nevertheless certain factors, such as the tremendous developments in the airplane, indicate some of the trends which may be expected in the period following the war.

In the afternoon W. R. Bean, chief, Foundry Equipment and Supply Unit, WPB, Washington, discussed the problems of the foundry equipment industry in meeting the demands of the war effort. Mr. Bean answered many questions pertaining to the various phases of WPB control.

In the final paper of the afternoon, Lewis M. Lind, Board of Economic Warfare, Washington, discussed "Foundry Equipment and the Post-War Period." After outlining the organization and work of the board, Mr. Lind stated that

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the post war problems which will effect the foundry equipment industry and which in turn can be influenced by equipment manufacturers are as follows: Post-war status of the durable goods industries in the United States; labor relations; plant modernization and development of new plants. Mr. Lind suggested that equipment manufacturers endeavor to find what other organizations are considering in their post war planning, and then determine where ferrous and nonferrous castings can fit into these plans.

Saturday morning was devoted to a round table discussion of various problems of the industry, with one representative of each company in attendance reporting.

Thomas Kaveny Jr., vice president, Herman Pneumatic Machine Co., Pittsburgh, was elected president, succeeding, P. J. Potter, vice president, Pangborn Corp., Hagerstown, Md. Otto A. Pfaff, president and general manager, American Foundry Equipment Co. Mishawaka, Ind., was elected vice president of the association. Directors elected at the meeting were Thomas Kaveny Jr., Herman Pneumatic Machine Co., Pittsburgh, Ralph W. Hisey, Osborn Mfg. Co., Cleveland, and B. C. O'Brien, vice president, Roots Connersville Blower Corp., Connersville, Ind. Other directors are William L. Dean, Mathews Conveyor Co., Ellwood City, Pa., R. S. Hammond, Whiting Corp., Chicago, H. S. Hersey, C. O. Bartlett & Snow Co., Cleveland, Otto A. Pfaff, American Foundry Equipment Co., Mishawaka, Ind., P. J. Potter, Pangborn Corp., Hagerstown, Md., and Orin C. Sabin, Steelblast Abrasives Co., Cleveland.

Book Review

Analysis of Cast Ferrous Metals, by E. Taylor Austin, cloth, 140 pages, 6 x 9¾ inches, published by the British Cast Iron Research Association, 21-23 St. Paul's square, Birmingham, England, price 15 shillings, post free.

This third edition of a well known and authoritative work on sampling and chemical analysis of cast ferrous materials has been revised and enlarged, and comprises methods which have been tried and used over a period of years in the laboratories of the British Cast Iron Research Association. The methods incorporated are primarily designed for works chemists and metallurgists engaged on acceptance tests on raw materials and products, and each contains a brief reference to the theory underlying each procedure so that the reasons can be understood better.

The book is divided into three parts. The first deals with chemical analysis of pig iron, plain cast iron and malleable cast iron, and covers preparation of samples, general laboratory technique, and analytical procedure. The second part discusses chemical analysis of alloy cast iron including sampling, application of methods of analysis given in Part I, and determination of alloying elements. The third describes chemical analysis of ferroalloys including sampling and analytical procedure.

Films on Grinding

Norton Co., Worcester, Mass., just completed a new series of colored motion pictures entitled, "Lessons in Grinding". It includes films on cutter sharpening, cylindrical grinder, surface grinder, and care and use of the grinding wheel. The films are available to industrial apprentice schools, army and navy training schools, colleges, universities, etc.

Technical Valuation Society, Engineering Societies building, 33 West 39th street, New York, will hold its annual forum on Dec. 12, 1942 at New York. Morning session will be devoted to prominent economists, appraisers and valuation engineers who will discuss present valuation problems.

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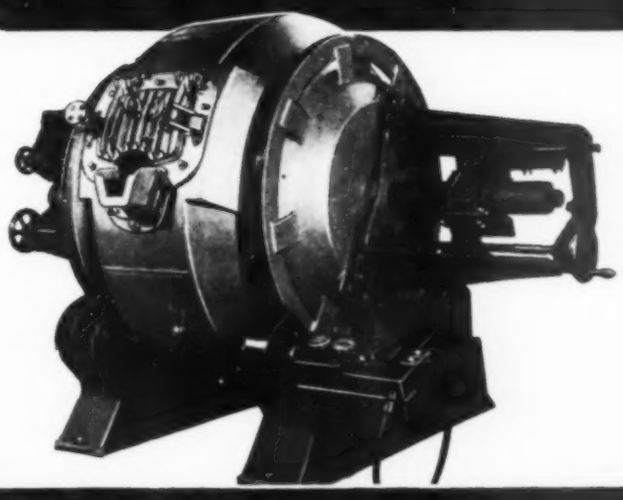

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THEORY OF SHRINKAGE IN GRAY CAST IRON

(*Continued from page 83*)

Such a condition exists whenever a volume of liquid metal is trapped within a mass of solid iron. When this occurs, no feeding can take place, since there is an insufficient quantity of molten metal to satisfy the volume contraction which results from the solidification of the entrapped liquid.

Usually when the volumes of entrapped liquid iron are small, the original austenite dendrites, which are the first crystals to form from the liquid iron when the liquidus temperature is attained, grow out from the walls of solid metal and build up an intermingled frame work. When the eutectic starts to freeze there is not enough metal to fill all the interstices of the dendrites and, due to gravity, the eutectic filters to the bottom where it solidifies, leaving voids around the dendrites at the top. Fig. 3 illustrates this condition in a gray iron casting. Note the voids surrounding the dendrites, cross sections of which are shown in the micrograph.

Cavities Are Formed

If a large quantity of molten metal is forced to solidify within the confines of a solid mass of metal, a cavity may result with its walls lined with dendrites which were formed while the liquid metal was in contact with the wall and which were left in an incomplete condition as the molten pool receded toward the bottom due to gravity and the contraction associated with solidification. See Fig. 1 and 2.

The problem, then, is chiefly one of *feeding*. If adequate heads or risers always could be provided for all sections of a casting to insure a sufficient reservoir of liquid metal which could satisfy the contraction taking place during solidification, or if all sections could be so designed that they would freeze from the bottom upward, the difficulty of porosity never would occur. Risers and heads are valuable in reducing or completely eliminating shrinkage in sections of a casting to which they may be joined. It is imperative, however, that the risers or the heads, and the necks connecting these accessories, be of sufficient cross section that they will freeze after the casting has solidified completely. Too often these parts freeze before the casting, making the head or riser useless as a source of supply for molten metal.

Formation of voids or porous sections in a casting apparently is related to a number of factors, some of which im-

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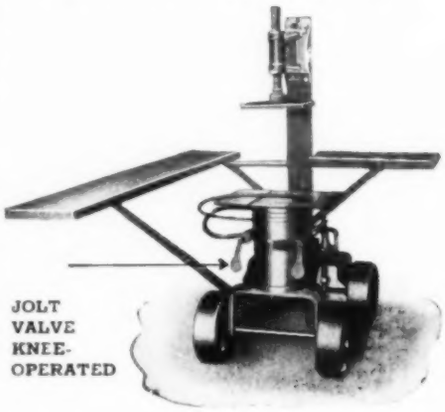

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mediately are apparent and some of which are not understood completely. The following apparent factors can be considered to appreciably influence the phenomenon of porosity or shrinkage in a gray iron casting:

(1) Change of density, or its reciprocal, specific volume, as the molten iron cools from the pouring temperature to the solidus temperature.

(2) Eutectic temperature of the composition dealt with and the temperature at which solidication normally begins.

(3) Temperature gradients within the casting.

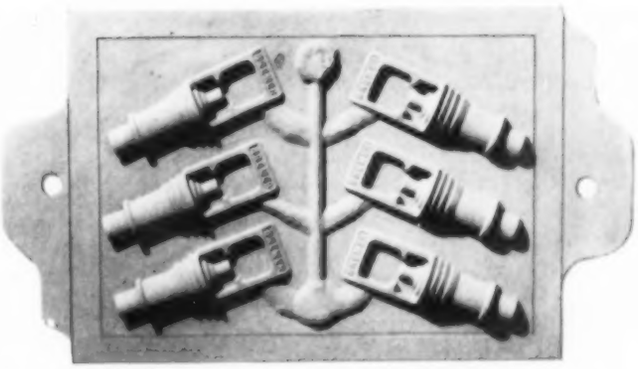
(4) Positions of gates and risers to feed the casting.

The first two factors are substantially dependent upon the composition of the iron. The last two are dependent upon the design of the casting, the construction of the mold and the pouring temperature.

Composition Affects Shrinkage

The most direct cause of shrinkage cavities or sponginess in a gray iron casting is the change in the density of the iron as it cools from the pouring temperature to the solidus. This change in density has been studied by Saeger and Ash, *Transactions* of the A.F.A., Vol. 40 (1932), who contributed the following quantitative information in the conclusions of their paper: "The coefficient of volume shrinkage in the liquid state for the irons over the range of temperature studied was 0.011 per cent per degree Cent. The volume change during solidification varied from an expansion of 1.65 per cent in a gray (hypereutectic) iron to a contraction of 5.85 per cent in a low-carbon low-silicon type of iron." (The *gray* iron contained 3.63 per cent carbon and 2.87 per cent silicon while the low-carbon low-silicon type of iron contained 2.29 per cent carbon, 1.24 per cent silicon).

It probably will be well at this time to give some consideration to the alloy diagram most nearly representative of the composition of gray cast iron in general, and the fundamentals of the freezing of a gray iron. Fig. 5 is a reproduction of the iron-carbon-silicon equilibrium diagram taken from, *The Alloys of Iron and Silicon*, by E. S. Greiner, J. S. Marsh and Bradley Stoughton. It can be seen that hypoeutectic irons possess an increasing range of temperature over which freezing takes place as the carbon content is reduced. The closer the carbon content is to the eutectic composition, the shorter will be the freezing range. The lower carbon irons having the longer freezing ranges, hence the greater volume changes (contraction) during solidification, are more susceptible to shrink holes and porosity and therefore, require more care in gating and



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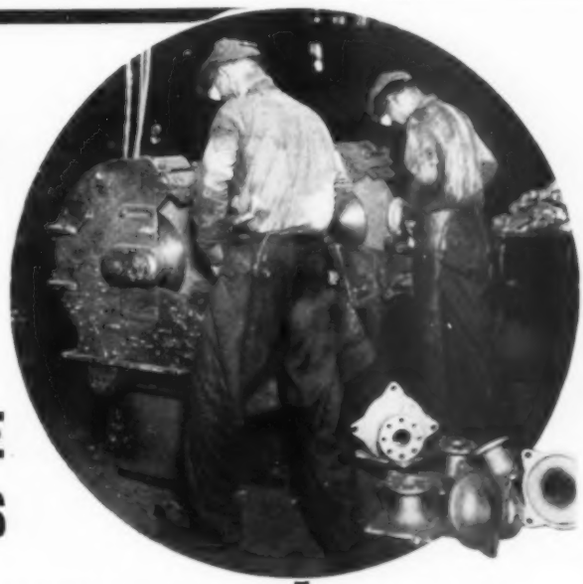

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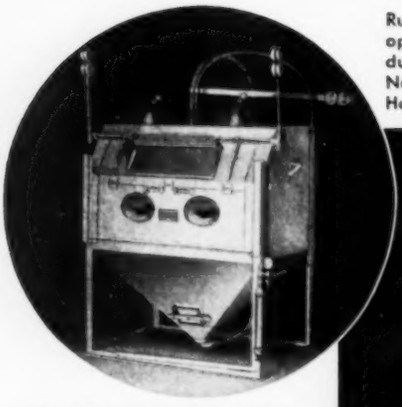

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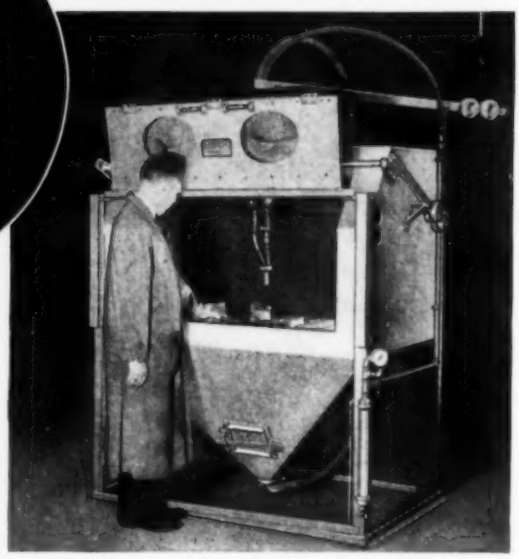

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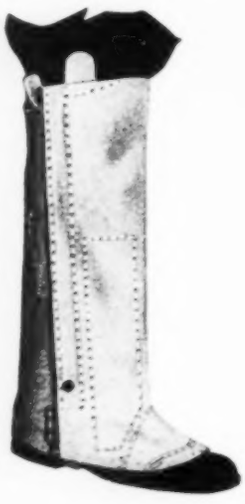

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feeding. With a short freezing range and a lower volume change the irons of nearly eutectic composition are least subject to shrinkage and porosity difficulties. Since the graphite and austenite of a given weight occupy a greater volume than the same weight of cementite, or austenite alone, it can be understood readily that the higher carbon irons which will contain more graphite will have a greater volume after solidication than a low carbon gray iron or a white iron and will, therefore, possess a decreased tendency toward the formation of shrinkage cavities.

Presence of other elements, such as sulphur, phosphorus, manganese and the usual alloying elements, tends to alter this diagram considerably but due to the complexity of studying more than three variables, we lack sufficient quantitative data to indicate the effects of these additional elements upon the Fe-C-Si system. However, it has been found that an iron containing 0.41 per cent phosphorus is not completely frozen until a temperature of approximately 1750 degrees Fahr. is attained (Boyles, see later reference), and it is logical to assume that additions of other elements also may reduce the eutectic temperature.

Paper Explains Process

In 1937, Alfred Boyles presented a paper before the American Institute of Mining and Metallurgical Engineers, entitled "The Freezing of Cast Iron," *Transactions* of A.I.M.E., Vol. 125, Iron and Steel division (1937) which added considerably to our fundamental knowledge. To that work the author is indebted for the following summarization of the solidification of a hypoeutectic gray cast iron:

> When the metal reaches the liquidus, the first crystals to form are the primary austenite dendrites which continue to grow until the metal attains the eutectic temperature. They are entirely independent of any other feature in the final structure. Since they are formed first, all that transpires later is confined to the spaces between them. They are never completed due to the intervention of a new mechanism, the freezing of the eutectic, hence they remain simply the skeletons of crystals. When the melt reaches the eutectic temperatur, solidication begins at various centers which grow equally in all directions, forming masses of spherical shape. Graphite flakes are formed immediately upon freezing and continue to grow radially as the spheres develop in size. The result is a rosette of graphite flakes centered about each crystallization point.

The following two quotations are also taken from the paper:

1. "Graphite flakes do not begin to form until the eutectic begins to freeze."
2. "As soon as the eutectic is completely frozen the flake structure is essentially complete."

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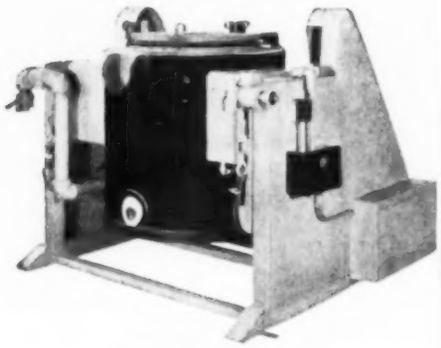

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With these fundamentals in mind, we can visualize more readily what would happen to a pool of molten iron trapped within a solid mass. When the liquidus temperature is reached, the dendrites of austenite start to precipitate from the mother liquor and a slight contraction in volume takes place. These dendrites become intermingled and build up a lattice work within the liquid. As they continue to form, the contraction in volume accompanying the change of state from liquid to solid, lowers the level of the liquid iron exposing the dendrites at the top of the original pool and the unfilled spaces between them form the voids which make up the undesirable porosity, sponginess, or shrink. When the eutectic starts to freeze there may be further reduction in volume or there may be a slight increase in volume, depending upon the composition. Size of the original pool, temperature gradient between solid metal and liquid metal, quality of graphite formed upon solidification of the eutectic, rate of cooling, and perhaps surface tension of the liquid, determine the size of the voids and the extent of the porous section.

Void Sizes Vary

It is thus conceivable that with a fine network of austenite dendrites, a high melting point for the eutectic, a relatively high surface tension for the liquid and a small pool of trapped liquid that the actual volume of voids would be divided so finely as to be almost obscure. However, with a large volume of trapped metal, a low melting point for the eutectic, a low surface tension and a slow rate of cooling, resulting in the formation of larger dendrites with greater spaces between them and a greater opportunity for the liquid to filter down through these dendrites as solidification proceeded, there would be an increased tendency to form large voids or shrink holes.

Temperature gradients always exist in a casting. Metal adjacent to the walls of the mold is cooled quickly and solidification takes place within a short time, producing a shell of solidified metal which grows in thickness as the heat from the molten interior is dissipated through this shell to the sand of the mold. Solidification takes place in a direction perpendicular to these walls. If the casting consists of a thin section, or plate whose longest dimension is in a vertical position, it is highly probable that some of the section will contain shrinkage cavities midway between the two vertical sides because solidification will progress from the side walls at the same rate from bottom to top; thus there will be no way to feed the lower portion of the casting with liquid metal which would be required to completely fill the mold after solidification has been

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completed, and there are no forces present to push the sides together to take up the contraction in volume. If the thin section were cast with its longest dimension in the horizontal position, the force of gravity would tend to pull the top surface downward, constantly maintaining a pressure which would aid in reducing, or perhaps eliminating, the formation of voids. Again, as soon as the top surface pulls away from the sand mold there is formed an air gap which would reduce the conduction of heat away from the casting at the surface and cause the most of the freezing to proceed from the bottom surface upward.

Gradients Affect Voids

For a given composition, the greater the temperature gradient between the outside and inside of an improperly fed casting, the greater will be the void volume remaining after solidification has been completed. These gradients may be increased by mold designs which place heavy sections next to light sections by increasing the size of the section itself, by increasing the moisture content of the mold, by the insertion of chills, and by raising the pouring temperature.

In attempting to control porosity in a production foundry, it is a general practice to establish some simple cast specimen which is used as a criterion for the performance of an iron with regard to shrinkage in a special type of casting being produced. For example, let us consider the production of engine blocks, units which often present serious difficulties in the production of sound castings. One large production foundry uses a wedge shaped casting poured in an open mold with the thin edge downward. It has been found that this particular wedge shows an internal shrinkage cavity in the heavy section when shrinkage defects also occur in certain parts of the motor block. Another foundry has established its criterion in a K-bar, dimensions of which are shown in Fig. 6. These are gated at the bottom of the heavy section and the casting lies horizontally in the mold. After solidification this casting is nicked with a saw cut at the junction of the three sections and fractured with a hammer blow. Fig. 4 shows two irons which produced shrinkage cavities when poured into this casting, and one iron which produced a sound casting.

This is the first of two articles taken from a paper presented by the author at the 1942 annual convention of the American Foundrymen's Association held in Cleveland. The second will appear in an early issue.

THE EDITORS.

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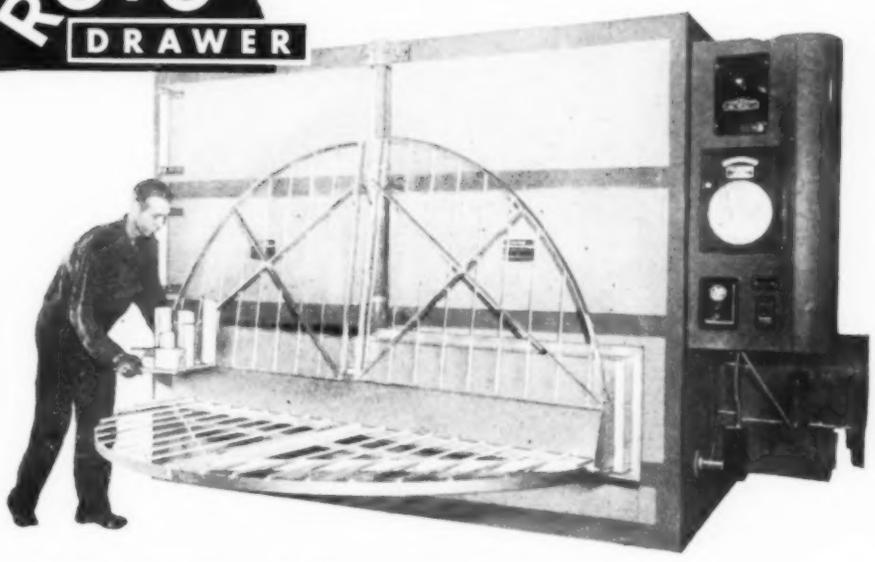

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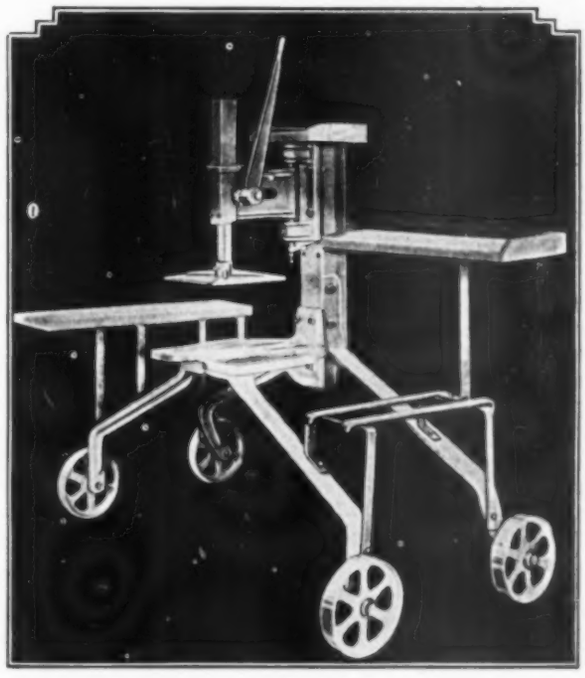

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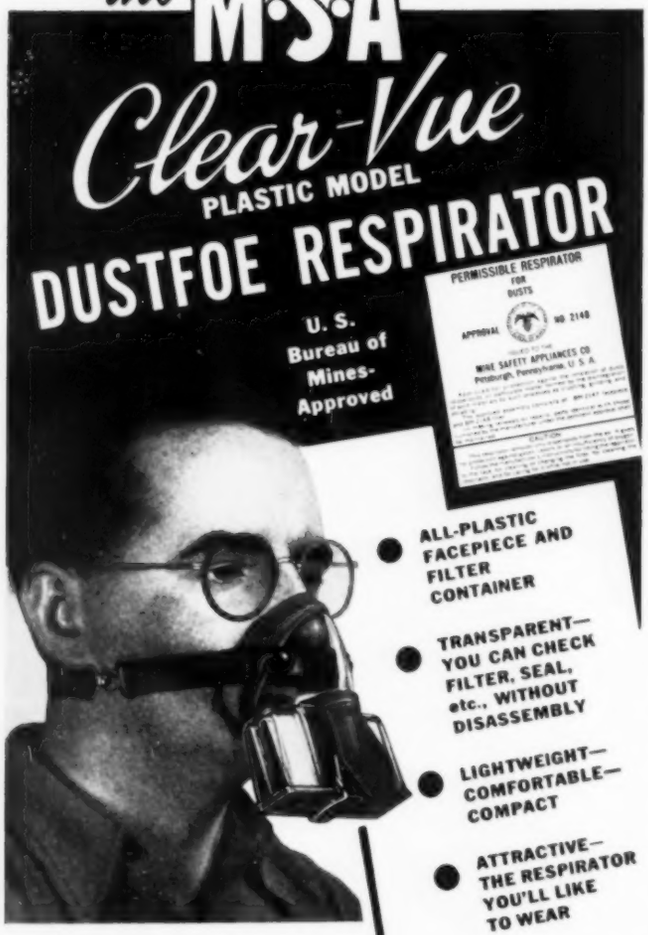

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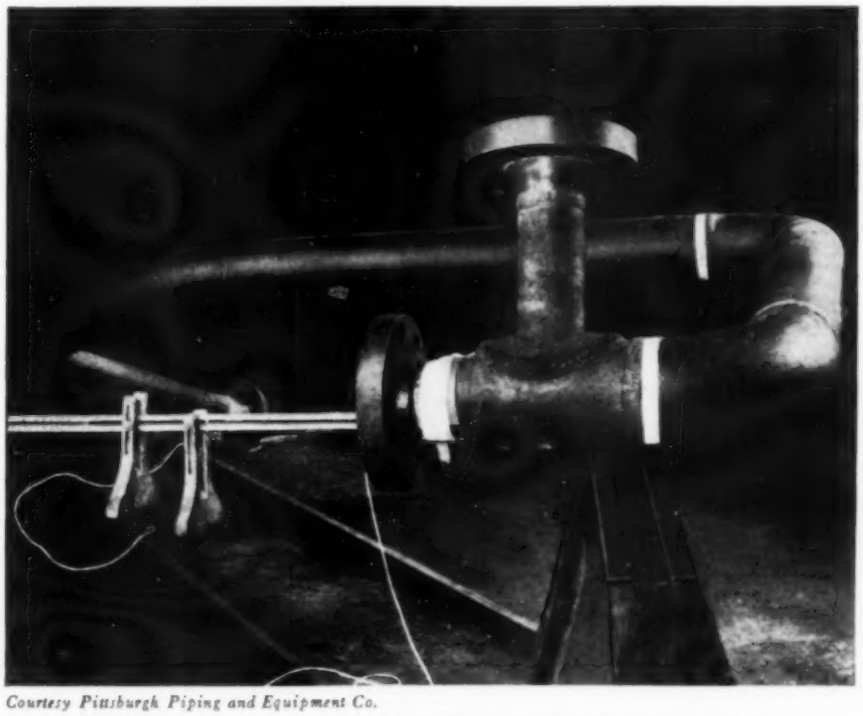

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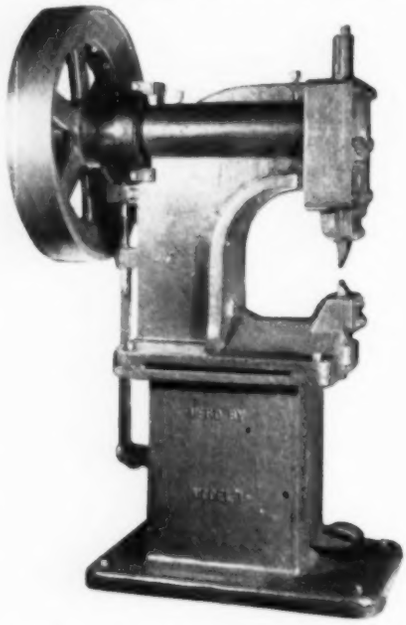

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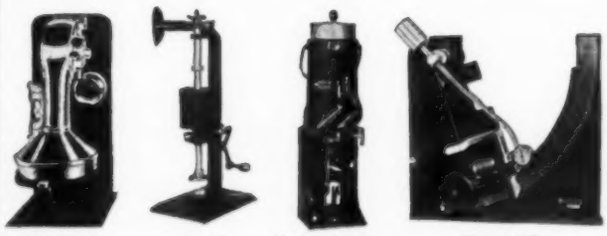

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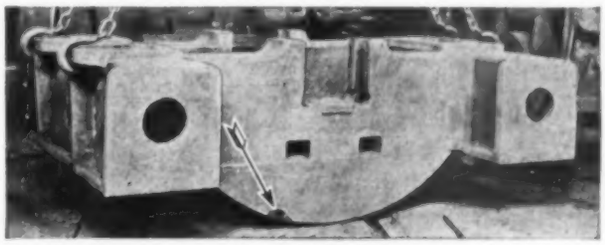

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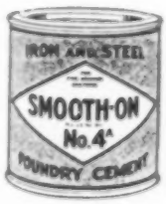

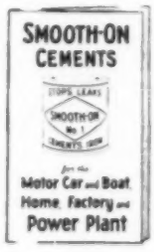

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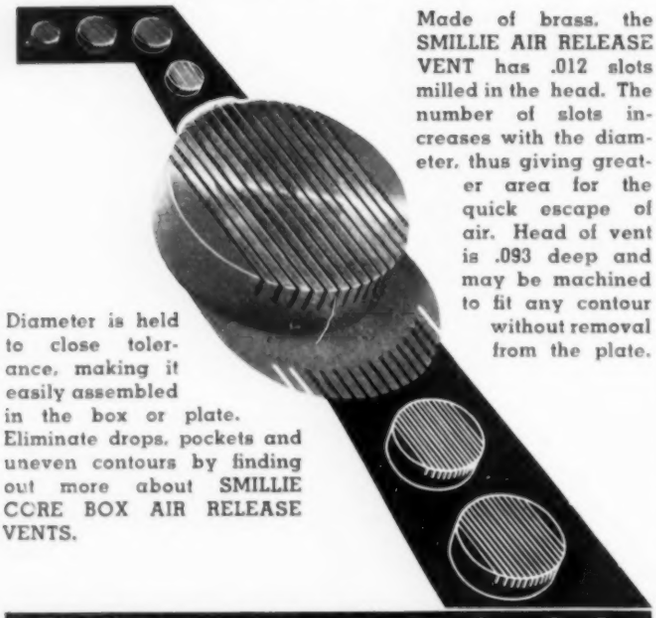

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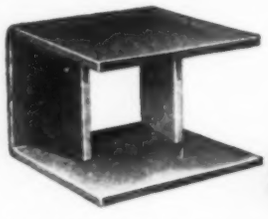

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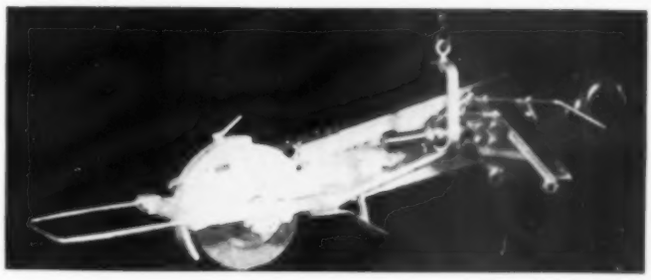

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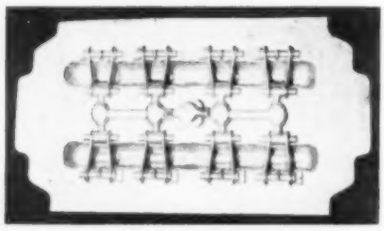

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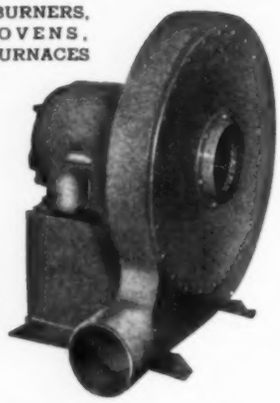

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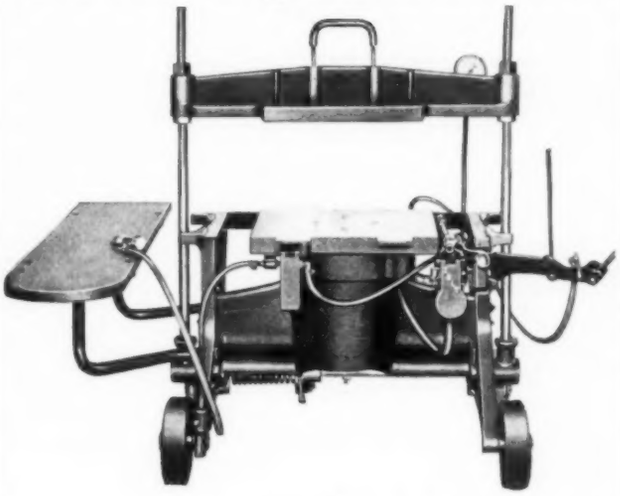

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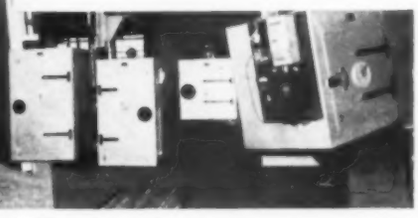

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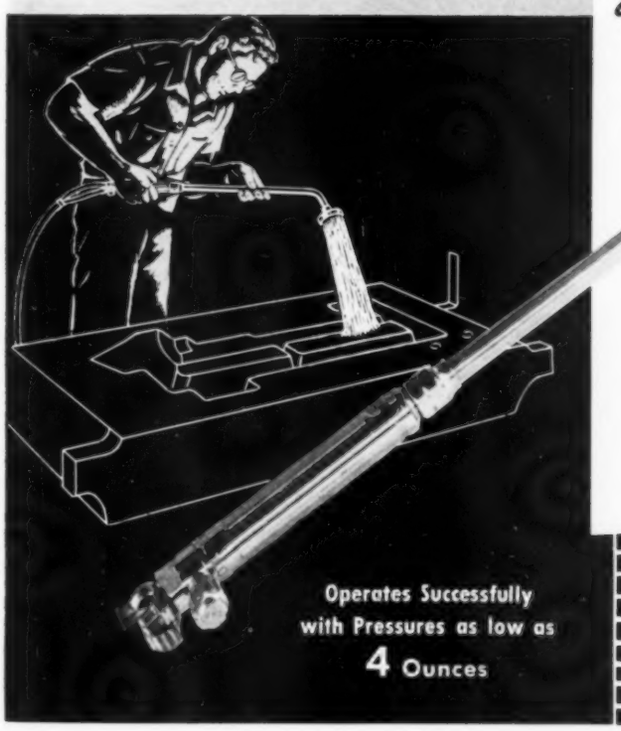

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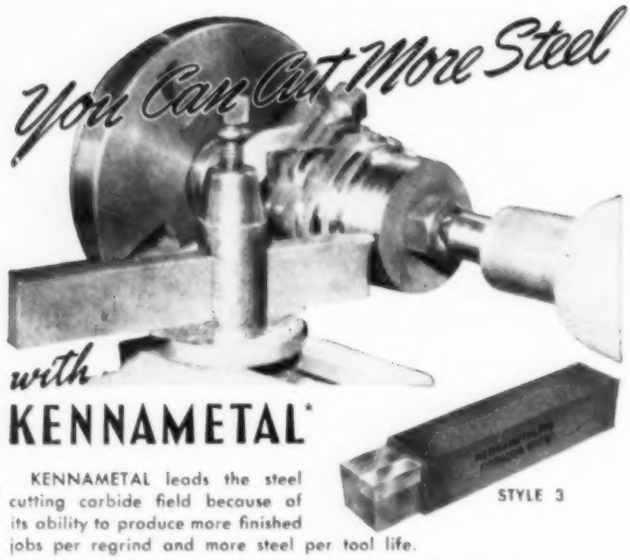

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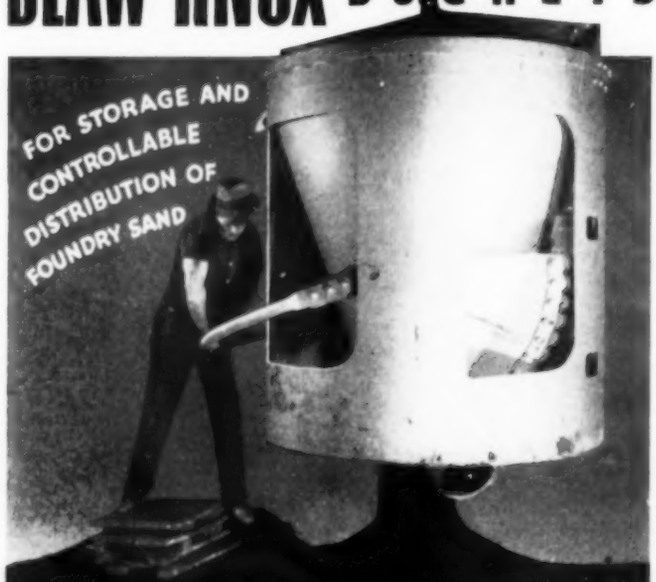

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How to
Extend the Life of Your

CURTIS AIR COMPRESSORS

● It will pay you to follow these suggestions on proper servicing of your Curtis Compressor. While long life is an inherent quality of every Curtis product, a little extra maintenance care now will extend its years of usefulness to help carry through today's critical times.

INSTALLATION . . . Be sure your compressor is in a clean, dry location in a level position; mounted solidly on a concrete foundation or bolted to an iron base. If motor driven, see that compressor and motor operate at recommended speed, in proper direction, and that motor specifications agree with current available.

LUBRICATION . . . Maintain proper oil level—check daily—oil only through oil filler cap—follow manufacturer's instructions. Use light grade auto cylinder oil. Drain and refill every three months. Keep oil off of belts.

COOLING WATER . . . Circulate a continuous supply of cooling water through jackets—either by connection to water lines or with water circulating pump. Under full load, cooling water should not exceed 125° F. When pump is used, keep pump suction always flooded.

SERVICING . . . Drain moisture from air tank at least weekly, preferably every day. When replacing head gasket, secure proper grade of material from manufacturer—do not use paper or soft rubber. Keep compressor clean.

TESTING . . . If air supply or pressure decreases, test all outlets, joints, and valves for leaks—using soapy water and brush. Periodically inspect check valves, safety valves, and valves in head of compressor. If they leak, remove and clean—oil them so as to work freely. Keep flywheel tight on shaft with nut and lock washer.

GENERAL . . . Discharge piping should be full size of compressor opening, as short as possible, with minimum number of bends. Don't use steam or water check valves; use dash pot or disc type. We recommend "V" belt drives with take-up provision. Consult instruction book when making repairs or replacements—when ordering parts or repairs, give serial number on nameplate.

By following these few service suggestions, you'll aid your Curtis Air Compressor to operate at peak performance throughout an unusually long, trouble-free life.

Curtis Pneumatic Machinery Division
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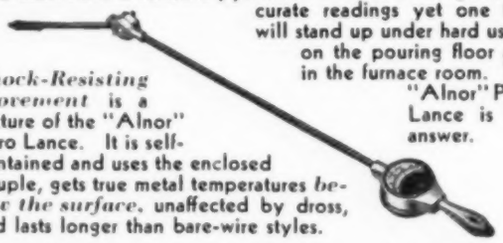
A Reliable Pyrometer is Indispensable
For sound non-ferrous castings . . . and for lower costs . . . you must have a reliable pyrometer . . . one that gives accurate readings yet one that will stand up under hard usage on the pouring floor and in the furnace room. The "Alnor" Pyro Lance is the answer.



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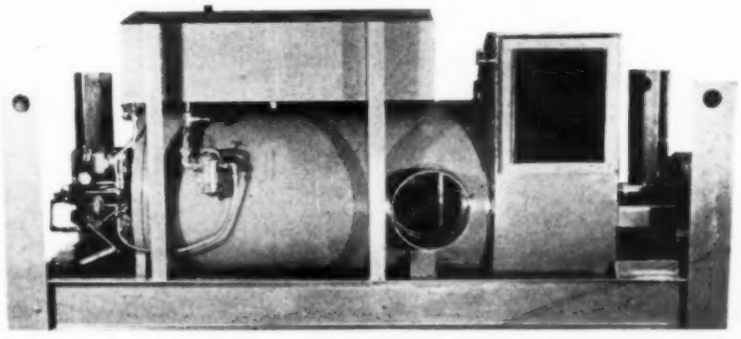

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Heater starts to dry the mould as soon as it is turned on. No time required to build up heat.

The mould is dried from the inside. Heated air passes over all inside surfaces of the mould, drying uniformly throughout and produces a clean mould without burnt spots or damp spots.

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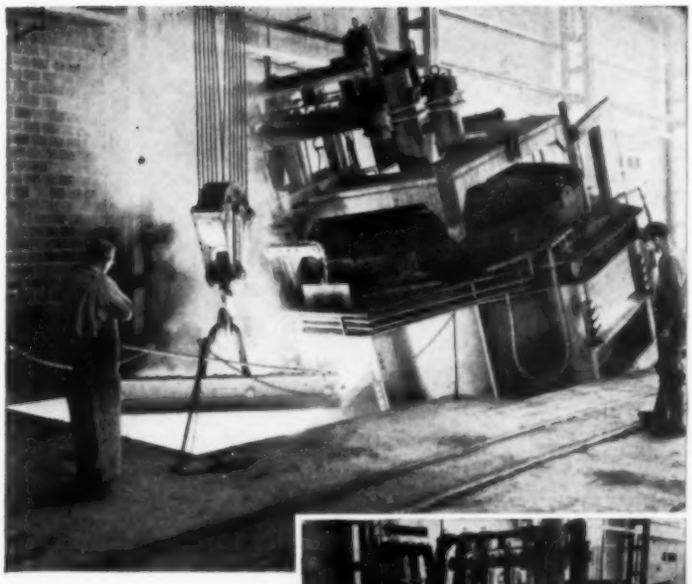

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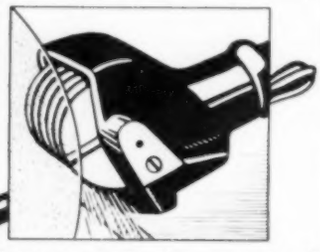

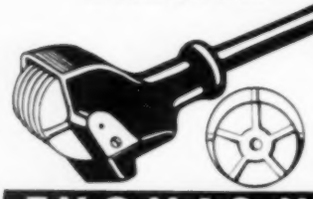

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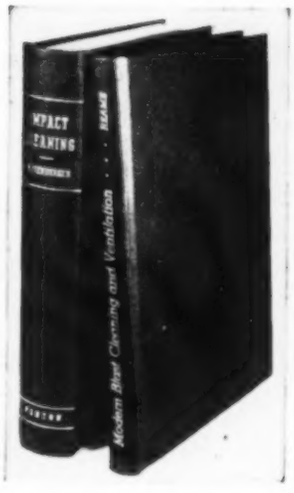

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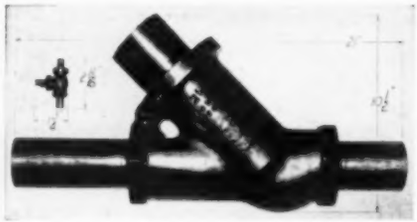

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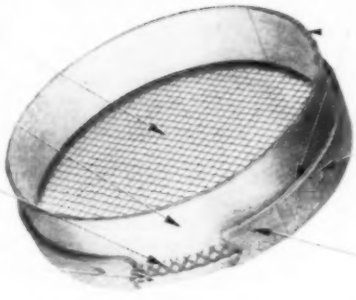

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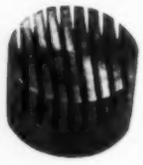

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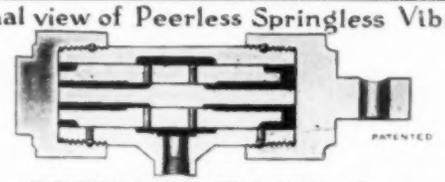

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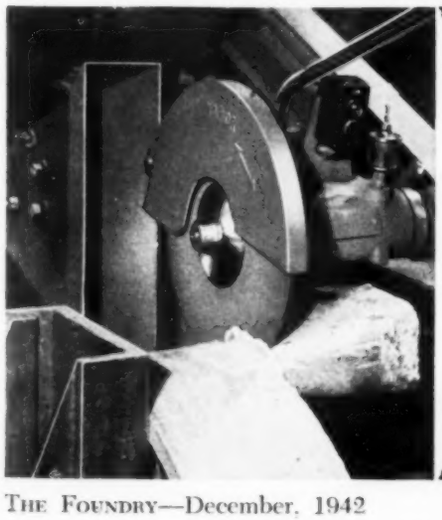

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Actual working knowledge of operations of modern foundry methods necessary. Must possess thorough knowledge of mechanical handling equipment as well as the ability to recommend new layouts. Experience in all phases of foundry production including coremaking, moulding, melting, and casting cleaning essential.

TIME STUDY MAN

Experience in foundry production work essential. Must possess definite knowledge of modern foundry operations including coremaking, moulding, and casting cleaning. Excellent opportunity for right man.

Applicants using full skill on Government contract work will not be considered.

PLEASE WRITE OR CALL IN PERSON

ECLIPSE AVIATION
BENDIX, N. J.

GENERAL FOUNDRY SUPERINTENDENT

AN UNUSUAL OPPORTUNITY FOR THE RIGHT MAN. MUST BE A LEADER, WILLING AND ABLE TO HELP A VERY MODERN PRODUCTION FOUNDRY ORGANIZATION OF OVER 230 MEN DO THEIR BEST WORK. MUST KNOW METALS, ESPECIALLY GREY IRON, FOUNDRY PRACTICES THOROUGHLY. A MAN WHO HAS MODERN IDEAS BOTH IN MANAGEMENT AND METHODS FOR ECONOMICAL PRODUCTION. THE MAN WANTED SHOULD HAVE PROPER SELLING AND CUSTOMER SENSE AND MUST FIT IN WITH A FAST MOVING AGGRESSIVE MANUFACTURING CONCERN. IF YOU ARE 35-45 YEARS OLD AND LOOKING FOR A FUTURE WHERE YOUR PERSONAL EFFORTS WILL BE REWARDED, AND IF YOU CAN RECOGNIZE THIS AS A RARE OPPORTUNITY THUS WILLING TO ASK A STARTING OR PROVING SALARY ACCORDINGLY, INVESTIGATE AT ONCE. THE PLANT IS LOCATED IN NORTHERN CENTRAL WISCONSIN CLOSE TO LARGE TRADING CENTERS AND WHERE LIVING IS GENERALLY AT ITS BEST. IF YOU ARE THIS MAN, ONE OF OUR CLIENTS, ESTABLISHED 50 YEARS, WANTS YOU TO GIVE FULL DETAILS IN FIRST LETTER. R. C. BRETH INC., ADVERTISING COUNSEL, GREEN BAY, WISCONSIN.

CLASSIFIED RATES

Position Wanted: 5c per word, minimum $1.50. Help Wanted: 6c per word, minimum $3.00. All other type advertisements: 10c per word, minimum $3.00. Copy should be received not later than 13th of month preceding date of issue. Address: The FOUNDRY, Penton Building, Cleveland.

Help Wanted

WANTED

Experienced non-ferrous foundry superintendent, one who can take full charge of all departments, handle castings up to two tons, and high pressure alloys. Wonderful opportunity for right man. State age, experience, wages desired. Foundry located in the Middlewest. Address Box 839, The FOUNDRY, Cleveland.

CORE OIL SALESMAN

For New York and Pennsylvania Territory. Prefer salesman thoroughly acquainted with this trade. Give complete detail and references in first reply. We are thoroughly established in this territory and can offer unusual inducement to the man that can qualify. Present salesman going into Army. Address Box 861, The FOUNDRY, Cleveland.

WANTED

Steel and gray iron molders
Union shop
N. & S. FOUNDRY COMPANY,
SEATTLE, WASH.

REPRESENTATIVE WANTED

Manufacturer of new line of Steel Buckets, Core Oven Cars, Core Racks, Jib Cranes, and Special Custom Built Foundry Equipment wishes to obtain representation by salesmen now calling on foundries regularly. Liberal commission. Please advise territory covered, lines now handled, and extent of experience in foundry field. Reply WILLIAM F. EICHFELD & SONS COMPANY, 2549 NORTH 30TH ST., MILWAUKEE, WISCONSIN.

FOUNDRY FOREMAN WANTED

For eastern steel foundry. Good opening for a man with past record of high performance. Write in detail giving complete story of exact work with various companies and references. State age and salary expected and how soon available. Address Box 850, The FOUNDRY, Cleveland.

WANTED

IN A FOUNDRY LOCATED IN BALTIMORE, MARYLAND, A MAN THOROUGHLY FAMILIAR WITH THE ELECTRIC PROCESS OF PRODUCING SMALL AND MEDIUM CASTINGS OF CARBON AND ALLOY STEELS. THE MAN SELECTED MUST BE A CAPABLE FOUNDRYMAN WITH THE ABILITY TO HANDLE MEN IN A SUPERVISORY CAPACITY. IN REPLY PLEASE STATE AGE, PAST EXPERIENCE, REFERENCES, AND SALARY DESIRED. Address Box 856, The FOUNDRY, Cleveland.

GRAY IRON FOUNDRY SUPERINTENDENT

Wanted for foundry in the East producing castings up to 300 pounds. State qualifications and starting salary expected. Foundry employes approximately 45 molders at capacity. Address Box 833, The FOUNDRY, Cleveland.

WANTED

MAN EXPERIENCED IN STEEL FOUNDRY CLEANING ROOM FOR POSITION AS SERVICE MAN WITH ESTABLISHED GRINDING WHEEL COMPANY. GOOD OPPORTUNITY FOR RIGHT MAN. IN ANSWERING PLEASE STATE FULL FACTS, AGE, DRAFT CLASSIFICATION, SALARY DESIRED AND RECENT PHOTOGRAPH. ADDRESS BOX 803, The FOUNDRY, CLEVELAND.

METALLURGICAL ENGINEERS

Large manufacturing company in Western Pennsylvania requires metallurgical engineering graduates or college men with experience in ferrous or nonferrous metals. Several openings that exist include special production follow and development work on steel forgings; heat treatment; steel, malleable and gray iron castings; brass, bronze, copper and aluminum castings; and wrought copper products. Salary depends upon extent of training and experience. Address Box 812, The FOUNDRY, Cleveland.

Classified Advertising

Help Wanted

WANTED

Two men, ages 25 to 40, with either engineering, mechanical, or gray iron foundry sales experience. Give full particulars in reply. Address Box 868, The FOUNDRY, Cleveland.

SUPERINTENDENT

FOR LARGE MALLEABLE FOUNDRY. GOOD OPPORTUNITY FOR ONE WHO CAN DEMONSTRATE REAL ABILITY. IF YOUR APPLICATION IS TO RECEIVE FULL CONSIDERATION, IT MUST GIVE COMPLETE DETAILS AS TO BUSINESS CONNECTIONS, EXACT DUTIES, REFERENCES, AGE, MARRIED OR SINGLE, AND SALARY EXPECTED. ADDRESS BOX 851, The FOUNDRY, Cleveland.

MACHINIST

Wanted to spend part time supervising and part time traveling as salesman for gray iron foundry. Address Box 832, The FOUNDRY, Cleveland.

Positions Wanted

NONFERROUS FOUNDRY FOREMAN

Wants position. Practical. Address Box 864, The FOUNDRY, Cleveland.

GENERAL MANAGER AVAILABLE

Arrangements consistent with general conditions secures the services of a mature, dependable general manager who will save his salary several times over in eliminating waste and skillfully handling personnel, sales, purchases, finance and other vital activities. Broad experience foundry, machinery and allied lines. Correspondence in confidence. Address Box 847, The FOUNDRY, Cleveland.

FOUNDRY FOREMAN OR SUPERINTENDENT

Age 42, high school education. Know gating and heading, also mounting of patterns for production. Can handle help. Steel or nonferrous castings. At present employed. Address Box 866, The FOUNDRY, Cleveland.

PATTERN MAKER

Having 30 years' experience making large and small wood patterns, now interested in employment with a Large Foundry. Outside work, Sales, Checking or supervising pattern work. Address Box 858, The FOUNDRY, Cleveland.

GRAY IRON FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN

Thirty years' foundry experience of which has been superintendent and general foreman for twenty years on jobbing machinery, castings, and practical foundryman in every detail. New Jersey preferred. Best reference. Address Box 826, The FOUNDRY, Cleveland.

FOUNDRYMAN

Chicago district, desires job as general superintendent or works manager of West Coast foundry. Twenty years' experience all types of iron and steel castings. Address Box 863, The FOUNDRY, Cleveland.

APPRENTICE SUPERVISOR

DESIRE POSITION AS SUPERVISOR OF BONA FIDE APPRENTICESHIP PROGRAM WITH FIRST CLASS ORGANIZATION OPERATING FOUNDRY, WITH OR WITHOUT MACHINE SHOP. WOULD CONSIDER ESTABLISHING APPRENTICESHIP PROGRAM WITH COMPANY DESIRING SERIOUS TRAINING PROGRAM TO DEVELOP HIGH GRADE WORKERS. YOUNG, AGGRESSIVE, AND CAPABLE. SEVERAL YEARS OF PRACTICAL FOUNDRY AND SHOP EXPERIENCE. COLLEGE GRADUATE. MECHANICAL ENGINEERING. ADDRESS Box 855, The FOUNDRY, Cleveland.

Employment Service

SALARIED POSITIONS
$2,500 to $25,000

This advertising service of 32 years' recognized standing negotiates for positions of calibre indicated. Procedure individualized to your personal requirements. Retaining fee protected by refund provision. Identity covered. If salary has been $2,500 or more send for details.

R. W. BIXBY, INC.
101 Delward Bldg. Buffalo, N. Y.

GRAY IRON FOUNDRY EMPLOYMENT

We are receiving many inquiries for superintendents, metallurgists and foremen. We shall be glad to hear from qualified men. No charge.

Gray Iron Founders' Society Inc.
1010 Public Square Building Cleveland, Ohio

Wanted-To-Buy

WANTED TO BUY

1300 to 1500 air compressor, or enough compressors to make 1500 ft. air. Also 150 KW 2300—250 V motor generator.

WANTED TANKS

12—10,000 gal. cap. or larger tanks to total 120,000 gal. cap.

RUSSELL STANHOPE,
Darien, Conn.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland.

WANTED AT ONCE

1—30 or 32 inch cupola. Must be in good condition. State price and location. Address Box 859, The FOUNDRY, Cleveland.

WANTED—IMMEDIATELY

ONE 200 LB. INDUCTION TYPE ELECTRIC FURNACE OR A "U" OR "T" SIZE MOORE 'LECTROMELT FURNACE.

FURNISH FULL INFORMATION AS TO AGE, CONDITION, SERIAL NUMBER, PRICE, LOCATION, AND DELIVERY.

CAMPBELL, WYANT AND CANNON FOUNDRY CO.

Muskegon, Michigan

Foundry Wanted

SUBSTANTIAL FOUNDRY WANTED

By engineering firm, designing admittedly superior equipment for power plants, railroads, etc., used by Government and defense industries, also having extensive peacetime record. Heavy tonnage of medium-weight and non-machined castings required. Products patented and highly profitable.

Address Box 865, The FOUNDRY, Cleveland.

Foundries for Sale

FOR SALE

Small foundry operating five days per week on own work. Address Box 853, The FOUNDRY, Cleveland.

FOUNDRY IN ANDERSON, INDIANA

250 x 300, modern in every respect.

Two 72" cupolas; 10-ton crane, 56-foot span; 4 cranes, 25-foot span, 5 tons each.

All fully equipped, and ready to start immediately.

Will lease or sell. Good labor market.

MARIETTA MANUFACTURING CORPORATION
Indianapolis, Ind.

GRAY IRON FOUNDRY FOR SALE

In Detroit area. Operating to near capacity. 16,500 square feet floor space. Has excellent organization. In good labor area. Good earning record and background.

IRVING N. ALLEN
Dime Bank Building Detroit, Michigan

FOUNDRY FOR SALE

Ideal location. Aluminum and Bronze. Frame and wood building, first floor 35' x 100', second floor 35' x 50' office quarters. Foundry equipment and line shaft included.

The Weatherproof Company
3265 West 17th St. Cleveland, Ohio

For Sale

REBUILT COMPRESSORS AND BLOWERS

1250 CFM, @ 3¼ lbs., 3600 RPM Gen. Elec. with 30 H.P. A.C. motor drive.

(3) Buffalo Forge Pressure Blowers, 1200 cfm @ 11 oz., 9½" inlet, 7 x 7 outlet, driven by 7½ H.P. A.C. Motors.

450 CFM, 3500 RPM Gen. Elec. with 6.2 H.P. A.C. motor drive.

SAND VIBRATOR

Jeffery-Traylor, shaker type CVS-8, 6" wide hand deck, capacity 7 to 8 tons sand per hour; with 15 cycle, 110 volt, single phase vibrator motor generator set. Write, wire or phone.

The Motor Repair & Mfg. Co.
1552 Hamilton Ave. Cleveland, Ohio

FOR SALE

Brass furnace, James Jones make, rotary-tilting, manually operated. Direct flame with oil burner attachment, capacity 750 lbs. Good condition. Price $400.00 f.o.b. Los Angeles, California. Address Box 819, The FOUNDRY, Cleveland.

AIR COMPRESSORS

BELTED—176 ft., 355 ft., 540 ft., 676 ft., 752 ft. & 1300 ft.

ELECTRIC—355 ft., 528 ft., 676 ft., 807 ft., 1302 ft., 1723 ft., 2022 ft., 2200 ft., 2800 ft., 3600 ft., & 5000 ft.

STEAM—368 ft., 500 ft., 800 ft., 1221 ft., 1640 ft., 2200 ft., & 3000 ft.

DIESEL—368 ft., 603 ft., 900 ft. & 1300 ft.

GASOLINE—110, 160, 220, 310, 1300 ft.

R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.

Classified Advertising

For Sale

HAMMERS FOR SALE

25 lb. Bradley Helve Hammer (2).

40 lb. Bradley Helve Hammer (3).

60 lb. Bradley Helve Hammer (1).

80 lb. Bradley Helve Hammer (1).

100 lb. Bradley Upright Strap Hammer (3).

150 lb. Bradley Upright Strap Hammer (2).

BOTWINIK BROTHERS, INC.

303 Welton Street **Hamden, Conn.**

FOR SALE

One No. 9 Buffalo cupola blower, good condition. One 2,000-lb. belt driven elevator, without platform.

H. C. MUNSON

158 Allen St. Massena, New York

REBUILT USED EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed. All sizes used steel flasks.

HAYNES FOUNDRY EQUIPMENT COMPANY

1734 Lake St. **Kalamazoo, Mich.**

GRINDER FOR SALE

48" BESLY Vertical Spindle DISC GRINDER arranged for motor drive.

BAUER MACHINERY COMPANY

1114 Frankford Ave. Philadelphia, Pa.

REGent 3093

EQUIPMENT IN STOCK

GUARANTEED IMMEDIATE SHIPMENT

MISCELLANEOUS ITEMS

(1)—Young Bros. Gas Fired Core Oven, 12' 6" deep x 8' wide x 7' 6" high, double doors one end, 4" insulation complete with burner, flues and pyrometer.

(1)—1¾" cap. Shuster Power Sprue Cutter.

(4)—large flask vibrators.

(1)—10-HP. Black & Decker, double end 230-VDC Grinder, capacity 24" wheels.

AIR COMPRESSORS & BLOWERS

(1)—Ing.-Rand XCB, 2-stage, 9¼ x 12 x 15 x 12, 100-HP. motor, 220-/3/60-cycle.

(1)—12 x 12 Chicago N.S.B. 375-CFM. @ 100 lbs. with idler, unloader and lubricator.

(1)—12 x 10 Penna. 365-CFM. @ 100 lbs. belt drive, 60-HP. C.W. slip ring motor, 220/3/60-cy.

(1)—No. 4 Wil. Green Positive Pressure cap, 13-cu. ft. per rev.

ELECTRIC MONORAIL HOISTS

(30)—½ to 5-ton, 1 and 2 motor, Fl. and Cage operated, 230/440-volts, 3-Ph. 60-CY, 110 and 230-VDC.

OVERHEAD ELECTRIC TRAVELING CRANES

(1) to 50-tons cap. 18' 0" to 91' 0" span, 220/440-volts, A.C. and 230-VDC. We operate the largest crane rebuilding plant in the country. Send us your specifications for Cranes, Electric Monorail Hoists, Crane Motors, Standard Motors, Steel Buildings and Runways. We can quote you on equipment rebuilt to your specifications.

T. B. MacCABE CO.

4304 Clarissa St. **Philadelphia, Pa.**

For Sale

CLOSING OUT

FOUNDRY EQUIPMENT

EVERYTHING PRICED TO MOVE AT ONCE

1—No. 1759 Size 4 Whiting Cupola complete with Buffalo blower, motor, etc.

1—Electric driven jolting machine Pridmore 36" x 48" type L complete

2—Pridmore hand squeezers

1—Osborn air squeezer

10—Pridmore hand-power core strippers

1—Pangborn Size 8 sandblast

1—Pangborn sand separator

6—Tumbling mills

1—Siracco exhauster

1—Vertical boring mill

1—Large Bury tandem air compressor complete with 50 h.p. motor, tank, etc.

1—Horizontal steam engine.

1—Engine lathe

Write, wire or phone today

CHANDLER COMPANY
CEDAR RAPIDS, IOWA

FOR SALE

One new Johnston & Jennings Jolt Roll-Over Molding machine. Immediate Delivery.

Springville Foundry Inc., Springville, N. Y.

FOR SALE

One Cabinet Type Sly Sandblast

Address Box 854, The FOUNDRY, Cleveland.

SPECIAL SALE

1—Dust Arrestor 12' x 12' x 8'.

1—Tumblast.

1—Sly Sand Blast Barrel 30" x 40".

1—Whiting 84" Cupola, 50 HP motor and blower.

1—Newton 40" shell, blower and 10 HP motor.

2—Speed Reducers.

1—No. 4 Roots Blower.

1—A-28 Davenport power jolt, power roll and power draw, 12" draw.

2—Motor-driven grinding wheel stands.

1—Chisholm-Moore electric crane, 4-ton capacity, three motors, span 18' 11".

HAYNES FOUNDRY EQUIPMENT COMPANY

1734 Lake Street **Kalamazoo, Mich.**

REBUILT

BLOWERS—FANS—EXHAUSTERS

Roots-Connersville positive cupola blowers. Centrifugal blowers for gas and oil burning. Sand blast, grinder end dust exhausters. Ventilating fans.

GENERAL BLOWER COMPANY

406 N. Peoria St. **Chicago, Ill.**

For Sale

EQUIPMENT FOR SALE

1—Crane Bridge—Cleveland Tramrail, 32' 5½" long O.A., Gross Capacity 6200 lbs.

1—Two-ton Electric Hoist with Carrier for above, Variable Speed, 3-60-440 V.

133 feet No. 3100 Cleveland Tramrail Arch Beam for Crane Runway.

Complete with hangers, supports and conductor bar.

Necessary lengths I-Beam and Channels for supporting Arch Beam Runways.

Practically new. **Immediate delivery.**

BAY CITY FOUNDRY COMPANY
Bay City, Michigan

FOR SALE

(1) 3-ton Heroult furnace complete except for controls and transformer.

(2) 1000 lb. Detroit rocking type electric furnace complete with 300 KVA 4600 volt transformer and panel board.

Address Box 671, The FOUNDRY, Cleveland.

FOR SALE

One No. 6 Piqua positive pressure blower, 20" x 60"—35 ft. displ. top discharge, mounted on bed-plate direct connected to 40 h.p. Wagner 3/60/220 A. C. motor, with starter . . . used.

Address Box 760, The FOUNDRY, Cleveland.

SPECIAL DEFENSE BARGAINS

Air Receivers up to 42" dia.

60" Cupola stack sections only.

Air Compressor, Ingersoll-Rand class ER-1-8" x 8" plate valves rated for 136' displacement and 120 lbs. pressure with idler pulley and unloader.

Fans—Blowers—Exhausters for cooling, ventilation, dust or fumes removal.

Fan or **Centrifugal** style blowers—Maxon-Premix—from No. 0 to No. 4. Spencer Turbine, Am. Blower Co., Sturtevant, Buffalo, Clarage, Ilg etc. for Gas or Oil fuel Combustion.

Rotary Pressure Blowers — Roots-Connersville, Garden City, Green, Piqua, Sturtevant, Am. Gas Furnace Co. etc. Send specifications.

Furnaces for Brass and Aluminum Melting—2—No. 2 U. S. Rotary Melting Furnaces—Normal capacities increased 50% in lengthened melting chambers.
Hausfeld Tilting Brass or Aluminum open flame, 400 lb. brass cap.; Booth Electric 725 lb. brass cap. with instruments. Stationary Furnaces, swing top for crucibles No. 60 to No. 150 and open top for iron pots up to 300 lb. aluminum.

Molding Machines—Osborn No. 404-S, Pit Type jolt-stripper. "Berkshire" 34" wide stationary air squeeze. "Tabor" 8" cyl. air squeeze. "Battenfeld" (Johnston & Jennings) stationary jolt squeeze; 5 in stock. Adams—Stationary hand squeezers 48" wide 2 in stock. Mumford—Stationary Air Squeeze 14 x 18" platen.

Crane Ladles—1½, 2, 3, 4 tons cap. Rim Pour.
1—25 H.P. Diesel Engine, horizontal.
1—Beardsley & Piper Gyratory sand screen size 36" x 59"—1 H.P. Ball Bearing 3/60/220 A.C. Motor, Vee Belt Drive.

Sand Blast Barrel—New Haven 36 x 44" for Motor direct connected, without motor.

Sand Blast Room—All steel 9'-10" x 20'-9" operators grilled table 3' x 10', down draft dust exhaust—8' ceiling. Air inlet thru ceiling.

Core Oven—Small portable 4 separate shelf compartments each 20" x 22" x 8" high.

Tell us your needs.

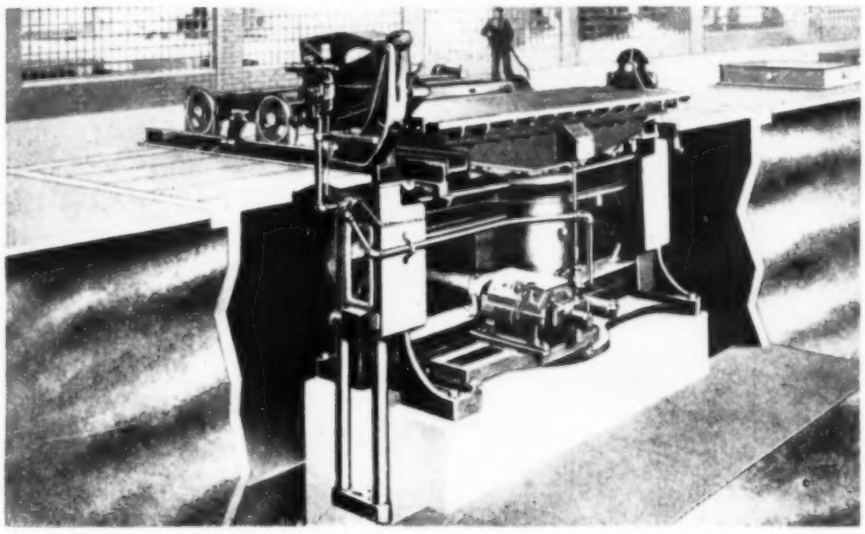
CLIFTON MACHINERY CO.

1023 W. 6th, CINCINNATI, O.

SCULLY Reconditioned Foundry Equipment

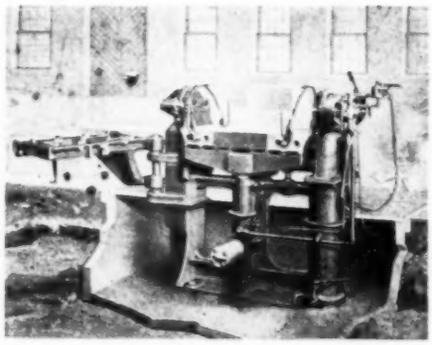
★ ALL SCULLY EQUIPMENT IS REBUILT AND OVERHAULED IN OUR OWN, NEW MACHINE SHOP

OSBORN MOLDING MACHINE



Osborn AIR JOLT, ELECTRIC ROLL-OVER PATTERN DRAW and RUN-OUT CAR
No. 509-E 60 x 96" roll-over table, 42 x 87" jolter.
No. 513-E 36 x 124" roll-over table, 36 x 112" jolter.

OSBORN Jolt Roll-Over Pattern Draw Molding Machines



No. 403, flask cap 44 x 36" pattern draw 12"—1400 lbs. cap. @ 80 lbs. press. with swing-out Mold Table.

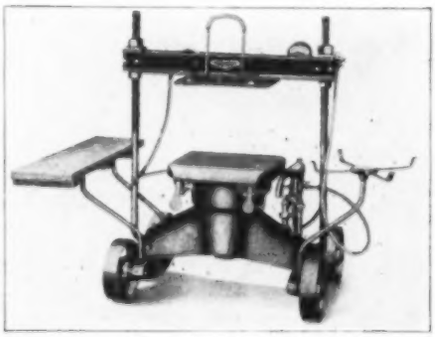
No. 403-W flask cap 52 x 36" pattern draw 12"—1300 lbs. cap. @ 80 lbs. press. with swing-out Mold Table.

No. 405, flask cap 50 x 64"—pattern draw 18", 3000 lbs. cap. @ 80 lbs. press. with run-out Mold Car.

No. 332, jolt roll-over and squeeze with roller conveyor attachment, flask cap., max. length 36" width 26" pattern draw 9"—750 lbs. cap. @ 80 lbs.

No. 333, flask cap. max. length 45" width 32"—pattern draw 11", 1400 lbs. cap. @ 80 lbs. press. squeeze cyl. dia. 19".

SQUEEZERS



No. 75-J Osborn portable JOLT SQUEEZERS, 36" between rods, 10" dia. squeeze cyl., 15 x 19" table.

Tabor stationary PLAIN AIR SQUEEZERS, 36" between rods, 18 x 26" table.

Tabor Power Squeezing SPLIT PATTERN for 13 x 18" flask, 13" dia. cyl. 36" between rods, 4" draw.

JOLT SQUEEZE & STRIP POWER

Milwaukee No. 113 Jolt Squeeze Strip, open end type, portable, 500 lbs. cap. @ 80 lbs. press, 6" draw, 16 x 35" table.

No. 142 Milwaukee, stationary, stripping cap. 1200 lbs. @ 80 lbs. press., draw 6" table 19 x 35"—open end type.

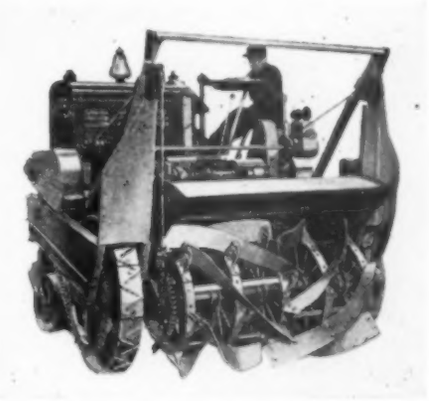
No. 703-6 Osborn jolt squeeze and strip, 21 x 28" table, stationary, length of opening in lifting frame 34", 6" pattern draw, 8" cyl. dia. 1000 lbs. jolt. cap. @ 80 lbs. pressure, distance from lifting frame to squeeze head 24¼", flask length 44½", with roll off conveyor.

No. 703-5 Osborn, same as above excepting 17 x 35" table.

AMERICAN SANDCUTTERS

Model "AA" size 72, 60" cutting cyl. 72" between tractor wheels, complete with 7½ HP AC Motor, Cable and Reel.

Model "AA" 68" cutting cylinder, 88" between tractor wheels, equipped with 15 HP Crocker-Wheeler 220V AC Motor, Cable and Take-Up Reel.



Cleveland Model "B" Type 5-55, 55" spiral cutting cyl. 26" dia.—66" between tractor wheels, equipped with 3 Cleveland Elec 220V AC Motors, Cable and Take-Up Reel.

Model "K" size 84"—72" cutting cyl. 84" between tractor wheels, 6" face, equipped with 30 HP Westinghouse 3/60/220V AC Induction Motor, Cable and Take-Up Reel.

Model "K"—84" spiral cutting cyl. 36" dia.—92" between tractor wheels, 5" face, equipped with 3—220V AC Motors, Cable and Take-Up Reel.

NO. 2 DEMMLER CORE BLOWING MACHINES

OVERHEAD ELECTRIC TRAVELING CRANES

Whiting BUCKET HANDLING DOUBLE DRUM CRANE 4-motor type, cage operated, 230V DC Motors, Drum Type Cont. 18'8" span, 7'0" track gauge, end trucks 15'0" wheel base.

3-ton MILWAUKEE 3-motor Type "C" GANTRY CRANE (suitable for 5-tons) 230V DC Motors, lattice type girders, 31'6" span, 25 ft. lift, overhang on each side approx. 12 ft., single drum parallel with bridge girders.

35-ton Morgan, 36 ft. span Power House Type 4-motors, 600V DC Motors, with Aux. Hoist.

5-ton Shepard Class "B" 18'5" span, 1-motor, floor control, 6 HP 220V DC, trolley hand racked, bridge hand racked.

1 ea., 1½, 2-tons Detroit Type "H" 26 and 29 ft. spans, "I" Beam Bridge Type Girders, 3-motors, 3/60/220V AC, floor operated, 10 ft. lift.

FLOOR STAND SNAGGING GRINDERS

No. 47 Ransom, take 24 x 4" wheels, 81½" arbor, where wheel goes on 2½", height from floor to arbor 32", equipped with 10 HP 800 RPM DC Motor, 40 x 65" floor space.

U. S. Heavy Duty, for 2½ x 20" wheels, equipped with 7½ HP 220V 850 RPM DC Motor, 67" arbor, 26 x 53" base.

Murray A-92 VERTICAL DISC GRINDER, take 26" dia. disc, ball-bearing, equipped with Watson 3/60/440V AC Motor, with COUNTER-WEIGHT for extra shaft.

SCULLY MACHINERY & EQUIPMENT CORP.

(Formerly—Foundry Division of Scully-Jones & Co.)

2031 WEST 74th STREET (Phone PROspect 8770) CHICAGO, ILLINOIS

WIN VICTORY WITH *Modern* EQUIPMENT

THE MODERN VICTORY LINE

Cupolas — Cupola Chargers — Covered & Insulated Ladles — Lifetime Geared Ladles — Improved Bottom Pour Ladles — Metal Pouring Systems — Crane & Monorail Systems For Metal & Mold Handling — Furnace Charging Cranes — Electric Mold Skin Driers

MODERN EQUIPMENT COMPANY

PORT WASHINGTON, WISCONSIN

MODERN EQUIPMENT CO.
PORT WASHINGTON, WIS.
DEPT. 190

Over 60 YEARS OF SATISFACTORY SERVICE To Foundries . . . .

That in itself bespeaks the dependability of Stevens Products. They have passed the most rigid tests, by actually "doing the job better."

Included on our staff are men who, through long years of experience, are well qualified to help solve difficult problems and recommend the right product for any specific job.

Tell us about *your* problems. We've rendered valuable aid to others, and we believe we can help you.

Whenever the Going is Tough

STEVENS Foundry Facings

Will Give Protection Against Defective Castings in

AIRCRAFT • TANKS • SHIPS • TRUCKS • GUNS • SHELLS

STEVENS CORE WASH

There is a grade of Stevens Core Wash that will prove just right for your job.

STEVENS CORE PASTE

Made in three grades. Highly adhesive and quick-acting. Eliminates pasting troubles of all kinds.

STEVENS PARTING COMPOUNDS

Sno-White non-silica Parting; Columbia—King of Tripoli Parting; Mol-Dust (lime-free); Liquid Parting.

STEVENS CEYLON PLUMBAGO

Designed to give the utmost in casting quality; minimize scrap losses and reduce casting defects.

STEVENS CARBON BLACKING

Gives excellent results when used as a wet blacking or as a green sand facing.

Buy DEFENSE BONDS

"Everything for a Foundry"

Buy DEFENSE BONDS

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